

# SERVICE MANUAL

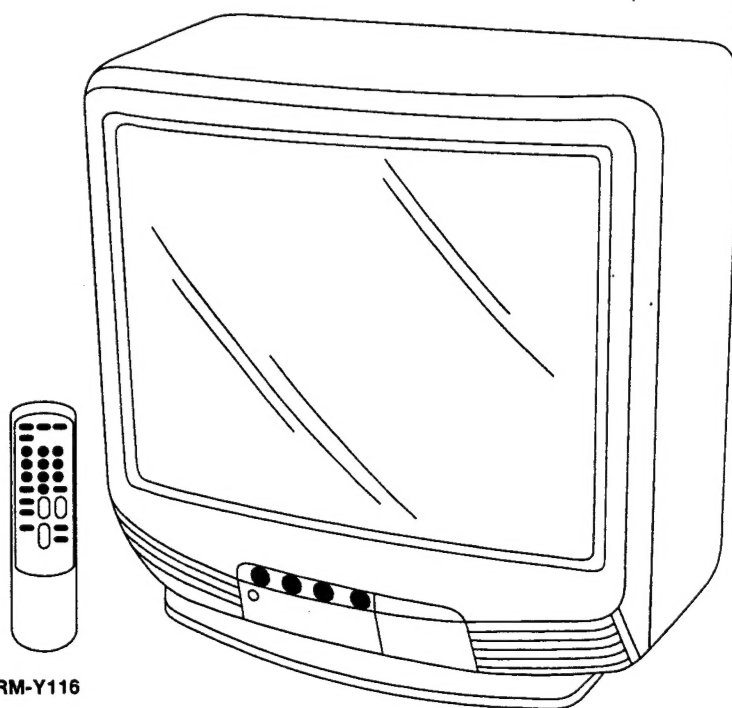
# BA - 3 CHASSIS

| MODEL    | COMMANDER | DEST. | CHASSIS NO. |
|----------|-----------|-------|-------------|
| KV-20M20 | RM-Y116   | CND   | SCC-J93B-A  |
| KV-20M20 | RM-Y116   | US    | SCC-J84B-A  |
| KV-20S20 | RM-Y116   | CND   | SCC-J93C-A  |
| KV-20S20 | RM-Y116   | US    | SCC-J84F-A  |
| KV-20S21 | RM-Y116   | US    | SCC-J84G-A  |
| KV-20S30 | RM-Y116   | CND   | SCC-J93D-A  |
| KV-20S30 | RM-Y116   | US    | SCC-J84C-A  |

| MODEL     | COMMANDER | DEST. | CHASSIS NO. |
|-----------|-----------|-------|-------------|
| KV-21R20  | RM-Y116   | E     | SCC-J94B-A  |
| KV-21RS20 | RM-Y116   | E     | SCC-J94C-A  |
| KV-21RD1  | RM-Y116   | MEX   | SCC-J95C-A  |
| KV-21PM1  | RM-Y116   | MEX   | SCC-J95D-A  |
| KV-21SD1  | RM-Y116   | MEX   | SCC-J95E-A  |
| KV-21PS1  | RM-Y116   | MEX   | SCC-J95F-A  |



SONY -08979



RM-Y116

KV-20M20



※ Please file according to model size.....



TRINITRON® COLOR TV  
**SONY®**

## SPECIFICATIONS

### For all models

|                      |  |
|----------------------|--|
| Television system    | American TV standards  |
| Channel coverage     | VHF: 2-13<br>UHF: 14-69<br>CATV: 1-125   |
| Picture tube         | Trinitron® tube<br>20-inch picture measured diagonally<br>21-inch picture measured diagonally              |
| Antenna              | 75Ω external antenna terminal for<br>VHF / UHF, F-Terminal   |
| Speaker size         | Full range 3 1/2 x 2 inches (90 x 50 mm)   |
| Power requirements   | 120V AC, 60Hz  |
| Dimensions (W/H/D)   | 20 1/2 x 18 3/4 x 18 1/2 inches<br>(522 x 477 x 471.7 mm)  |
| Supplied accessories | Remote Commander RM-Y116 (1)<br>with 2 AA size (R6) battery<br>Dipole antenna (1)<br>Antenna connector (1) |

### ■ KV-20M20/21R20/21RD1/21PM1

|                   |  |
|-------------------|--|
| Input             | VIDEO (phono jacks): 1Vp-p, 75Ω<br>unbalanced negative sync<br>Audio (phono jacks):<br>500 mVrms (100% modulation)<br>Impedance: 47Ω<br>A/V input (Rear) |
| Output            | Earphone jack  |
| Speaker output    | 1 speaker 2W(8Ω)   |
| Power consumption | 90W when in use<br>6W in standby   |
| Weight            | 46 lbs 13 Oz (21.3 Kg)   |

Design and specifications are subject to change without notice.  
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### ■ KV-20S21/20S20/21RS20/21SD1/21PS1/20S30

|                   |   |
|-------------------|---|
| Input             | VIDEO (phono jacks): 1Vp-p, 75Ω<br>unbalanced negative sync<br>Audio (phono jacks):<br>500 mVrms (100% modulation)<br>Impedance: 47Ω<br>A/V input (Rear)<br>Front A/V input (KV-20S30 only) |
| Output            | Headphone jack<br>Audio Out (KV-20S30 only)<br>More than 800 mVrms at the maximum<br>volume setting (Variable)<br>More than 800 mVrms (Fix)<br>Impedance: 5KΩ                               |
| Speaker Output    | 2 speaker (2W x 2) 8Ω   |
| Power consumption | 90W when in use<br>7W in standby  |
| Weight            | 47 lbs.(21.4 Kg)  |

## SAFETY CHECK-OUT

( US model only )

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.
3. Check that all control knobs, shields, covers, ground straps, and mounting hardware have been replaced. Be absolutely certain that you have replaced all the insulators.
4. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
5. Look for parts which, through functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
6. Check the line cords for cracks and abrasion. Recommend the replacement of any such line cord to the customer.
7. Check the condition of the monopole antenna (if any). Make sure the end is not broken off, and has the plastic cap on it. Point out the danger of impalement on a broken antenna to the customer, and recommend the antenna's replacement.
8. Check the B+ and HV to see they are at the values specified. Make sure your instruments are accurate; be suspicious of your HV meter if sets always have low HV.
9. Check the antenna terminals, metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

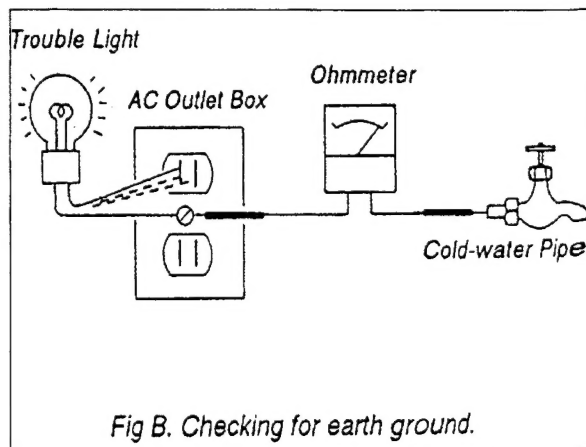
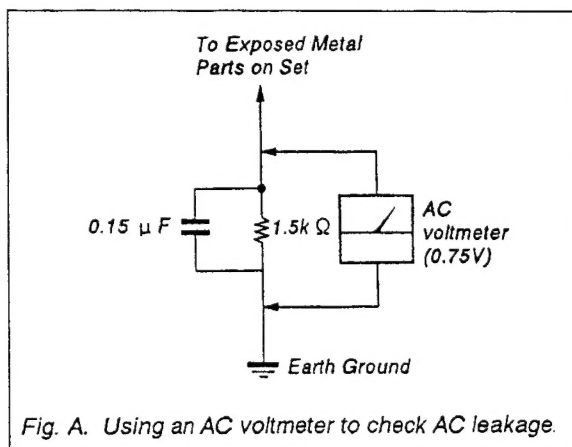
### LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 0.5mA (500 microamperes). Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliampmeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 0.75V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 2V AC range are suitable. (See Fig. A)

### HOW TO FIND A GOOD EARTH GROUND

A cold-water pipe is guaranteed earth ground; the cover-plate retaining screw on most AC outlet boxes is also at earth ground. If the retaining screw is to be used as your earth-ground, verify that it is at ground by measuring the resistance between it and a cold-water pipe with an ohmmeter. The reading should be zero ohms. If a cold-water pipe is not accessible, connect a 60-100 watts trouble light (not a neon lamp) between the hot side of the receptacle and the retaining screw. Try both slots, if necessary, to locate the hot side of the line, the lamp should light at normal brilliance if the screw is at ground potential. (See Fig. B)



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### (CAUTION)

SHORT CIRCUIT THE ANODE OF THE PICTURE TUBE AND THE ANODE CAP TO THE METAL CHASSIS, CRT SHIELD, OR CARBON PAINTED ON THE CRT, AFTER REMOVING THE ANODE.

### WARNING!!

AN ISOLATION TRANSFORMER SHOULD BE USED DURING ANY SERVICE TO AVOID POSSIBLE SHOCK HAZARD, BECAUSE OF LIVE CHASSIS.  
THE CHASSIS OF THIS RECEIVER IS DIRECTLY CONNECTED TO THE AC POWER LINE.

### SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK  $\Delta$  ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS, AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY. CIRCUIT ADJUSTMENTS THAT ARE CRITICAL TO SAFE OPERATION ARE IDENTIFIED IN THIS MANUAL. FOLLOW THESE PROCEDURES WHENEVER CRITICAL COMPONENTS ARE REPLACED OR IMPROPER OPERATION IS SUSPECTED.



## SECTION 1 GENERAL

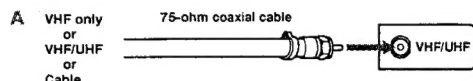
The operating instructions mentioned here are partial abstracts from the Operating Instruction Manual. The page numbers of the Operating Instructions remain as in the manual.

### Step 1: Connecting the TV

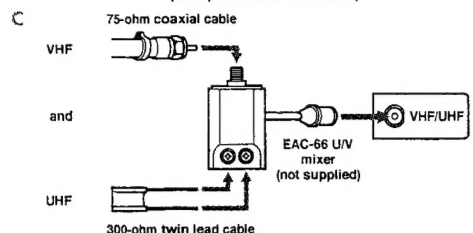
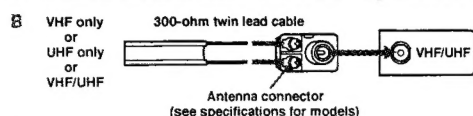
You can use an indoor antenna, outdoor antenna, or cable system with your TV. Outdoor antennas or cable TV systems usually provide the best picture quality.

#### Connecting an Indoor, Outdoor or Cable Antenna

Connect your antenna or cable to the TV's VHF/UHF antenna terminal.

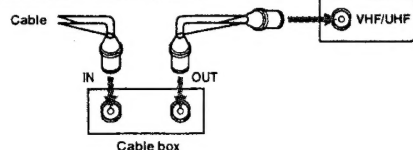


If you cannot connect your antenna or cable directly to the TV antenna terminal, follow one of the diagrams below.



#### Connecting to a Cable TV System Through a Cable Box

If your cable system requires use of a cable box, make the connection as shown below.



#### Connecting a VCR

See your VCR instructions to set up the VCR. After connecting the VCR to the TV, you will be able to do the following:

- Watch video tapes
- Record one TV program while viewing another

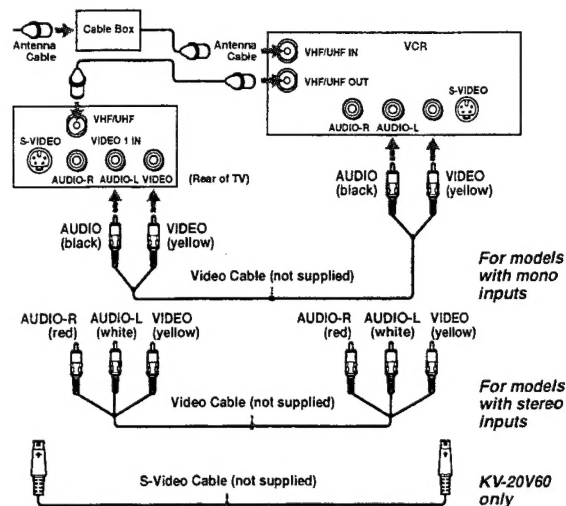
Check the model number of your TV and select the appropriate connection diagram.

##### Notes

- If your cable system requires use of a Cable Box, install it between the VCR and the TV.
- For a monaural VCR, connect the audio output of the VCR to AUDIO L (MONO) on the TV.
- Connect your S-Video cable (KV-20V60 only) to the S-Video input on the TV. S-Video will override your standard video input, providing the most stable picture.

3

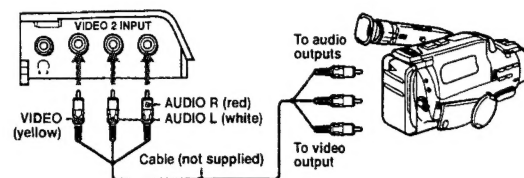
Warnings and Cautions • Connecting the TV • Connecting an Antenna • Connecting a Cable Box • Connecting a VCR



#### Connecting a Camcorder

##### KV-13M30, 13M31, 20S30, 21RS30C only

Use this connection to view a video tape from a camcorder.



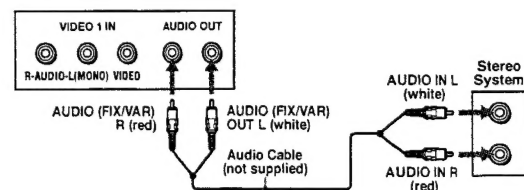
##### Notes

- For a monaural camcorder, connect the audio output of the camcorder to AUDIO L (MONO) on the TV.
- If you are connecting your camcorder to a monaural TV (KV-13M30, 13M31 only), plug the audio connector into the AUDIO input on the TV.
- You can also connect a camcorder to inputs on the rear of the TV.

#### Connecting an Audio System

##### KV-20S30, 21RS30C only

To listen to TV audio through a separate stereo system, connect the TV as shown below. See page 11 to switch to the external speakers.



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## Step 2: Using the Remote Control

Instructions in this manual are based on using the remote control. You can also use the controls on the TV.

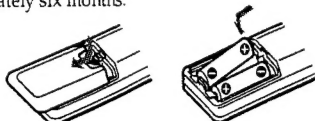
The menu illustrations are from KV-20M20. When features found on other models are discussed, the manual lists the models covered by that specific set of menus.

### Note

- The menu disappears 90 seconds after you press a button, or immediately after you press MENU.

## Inserting Batteries

Insert two size AA (R6) batteries (supplied) by matching the + and - on the batteries to the + and - inside the battery compartment. With normal use, the batteries should last for approximately six months.



### Notes

- Remove the batteries to avoid possible damage from battery leakage if you will not be using the remote control for an extended period of time.
- Handle the remote control with care. Avoid dropping it, getting it wet, or placing it in direct sunlight, near a heater, or where the humidity is high.

## Changing the Menu Language

### Except Canadian models

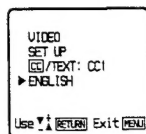
If you want to view the menus in Spanish, you can change the menu language.

- Press MENU. The Main menu appears.



- Press Δ+ or ∇- to move the cursor (►) to ENGLISH and press RETURN.

ENGLISH will turn red.



- Press Δ+ or ∇- to select ESPAÑOL and press RETURN.

ESPAÑOL will turn green.



- Press MENU to return to the TV program.

### Note

- Some parts of the Spanish menus will appear in English.

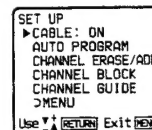
5

## Step 3: Setting up Your Channels

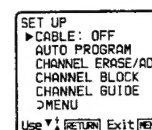
### Setting Cable TV On or Off

If you have connected the TV to a cable TV system, set CABLE to ON. If not, set CABLE to OFF.

- Press MENU.
- Move the cursor to SET UP and press RETURN.
- Move the cursor to CABLE and press RETURN.



- Press Δ+ or ∇- to select ON or OFF.
- Press RETURN.
- Press MENU to return to the TV program.



### Note

- If the screen is black, the TV is set to a video input and you cannot select CABLE. Press TV/VIDEO until a channel number appears, then follow steps 1-6.

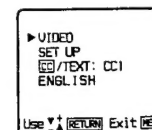
## Auto Programming Your Channels

TV channels can be preset easily. First, you can store all the receivable channels automatically. Later, you can erase unwanted channels or add additional channels.

### Notes

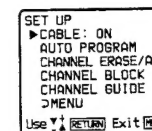
- If the TV is set to VIDEO, you cannot run AUTO PROGRAM. Press TV/VIDEO on the remote control until a channel number appears.
- It is usually best to preset channels during the day when the greater number of channels are broadcasting.

- Press MENU. The Main menu appears.



- Press Δ+ or ∇- on the remote control to move the cursor (►) to SET UP. Press RETURN.

The SET UP menu appears.



- Press Δ+ or ∇- to move the cursor to AUTO PROGRAM and press RETURN.

AUTO PROGRAM appears on the screen and the TV starts scanning and presetting channels.

When all of the receivable channels are stored, AUTO PROGRAM disappears.

### Note

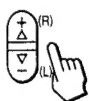
- AUTO PROGRAM will tune in all of the channels in your area, including some with weak or scrambled signals. They will appear fuzzy on the screen. You can erase them using CHANNEL ERASE/ADD.

6

## Erasing or Adding Channels

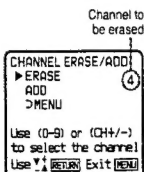
After you run AUTO PROGRAM, you can erase unnecessary channels or add new ones.

- 1 Press MENU.
- 2 Press  $\Delta$  or  $\nabla$  to select SET UP and press RETURN.
- 3 Press  $\Delta$  or  $\nabla$  to select CHANNEL ERASE/ADD and press RETURN.



- 4 To erase or add an unwanted channel:

- (1) Press CH +/- or 0-9 to select the channel you want to erase or add.
- (2) Press  $\Delta$  or  $\nabla$  to select ERASE or ADD.
- (3) Press RETURN.



If you are erasing a channel, the "-" symbol appears next to the channel number. If you are adding a channel, the "+" symbol appears next to the channel number.

- 5 To erase or add other channels, repeat step 4.
- 6 Press MENU to return to the TV program.

### Note

- If you erase or add a VHF or UHF channel, the cable TV channel with the same number is also erased or added.

## Watching the TV

Press POWER to turn the TV on.

### Note

- If VIDEO appears on the screen, press TV/VIDEO so that a channel number appears.

## Selecting a Channel Directly

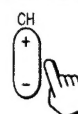
Press 0-9 to select a channel.

The channel will change after 2 seconds, or you can press ENTER for immediate selection.



## Scanning Through Channels

Press CH +/- until the channel you want appears.



## Jumping Quickly Between Two Channels

Press JUMP.

The TV switches from the current channel to the previous channel that you watched.

Pressing JUMP again switches back to the first channel.

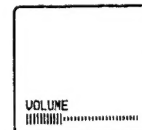


### Note

- You can only jump to channels you have selected with the 0-9 keys, or back to the last channel you scanned.

## Adjusting the Volume

Press VOL +/- to adjust the volume.



## Muting the Sound

Press MUTING.

MUTING appears on the screen.

To restore the sound, press MUTING again, or press VOL +.



## Displaying On-Screen Information

Use the DISPLAY key to check the TV's Display settings.

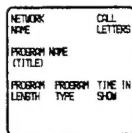
- 1 Press DISPLAY.



The channel number will be displayed. The TV will also display the MTS mode if SAP, MAIN, or MONO are selected (except KV-13M20, 13M30, 20M20). The MTS mode display disappears after 4 seconds.

- 2 Press DISPLAY again.

XDS ON will appear on the screen. If XDS (Extended Data Service) is broadcasting, information will then appear on the screen (except KV-13M20, 14PM1, 14R20, 14R20C, 14RD1).



- 3 Press DISPLAY again.

CC1 ON (if selected) will appear on the screen for a few seconds. Captions will then appear at the top or bottom of the screen.

- 4 To turn off Caption Vision or XDS display, press DISPLAY again until DISPLAY OFF appears.

### Note

- See page 13 for more information about Caption Vision.

## Watching Video Tapes

- 1 Press TV/VIDEO until the correct video input appears.



- 2 Press PLAY on your VCR to view the video tape.

## Setting the Sleep Timer

Sleep Timer allows the TV to stay on for a length of time and then shut off automatically.

- 1 Press SLEEP until the time you want appears.

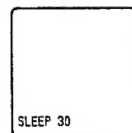


Each time you press SLEEP, the display moves between 30, 60, 90, and OFF.

In a few seconds, the SLEEP message disappears.

TV WILL BE OFF SOON appears one minute before the TV shuts off.

- 2 To cancel the Sleep Timer, press SLEEP again until SLEEP OFF appears, or turn off the TV.



## Using the VIDEO Menu

### Adjusting the Video Settings

You can adjust the picture, hue, color, brightness, and sharpness of any TV image.

- 1 Press MENU.

- 2 Move the cursor (►) to VIDEO and press RETURN.



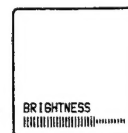
- 3 Press ▲+ or ▼- to select the feature that you want to adjust and press RETURN.

See the Adjustable Items chart for a list of the adjustments you can make.



- 4 Press ▲+ or ▼- to adjust the setting of the selected feature and press RETURN.

The new setting appears in the VIDEO menu.



- 5 To adjust other video settings, repeat steps 3 and 4.
- 6 Press MENU to return to the TV program.

### ADJUSTABLE ITEMS

| Item       | Press ▲+ (R) to          | Press ▼- (L) to          |
|------------|--------------------------|--------------------------|
| PICTURE    | Increase the contrast    | Decrease the contrast    |
| HUE        | Increase the green tones | Decrease the green tones |
| COLOR      | Increase color intensity | Decrease color intensity |
| BRIGHTNESS | Brighten the picture     | Darken the picture       |
| SHARPNESS  | Sharpen the picture      | Soften the picture       |

### Restoring the Factory Video Settings

- 1 To restore the factory video settings, press RESET while the VIDEO menu is displayed.

All the settings except PICTURE are restored to factory settings.

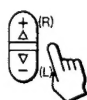
## Additional Features

### Selecting Stereo or Bilingual Programs (MTS)

**KV-20S20, 20S21, 20S30, 20V60, 21PS1, 21RS20, 21RS20C, 21RS30C, 21SD1 only. Menus shown are for KV-20S20.**

The Multichannel TV Sound (MTS) feature allows you to enjoy stereo sound (MAIN), Second Audio Programs (SAP), or monaural sound (MONO) when available.

- 1 Press MENU.
- 2 Move the cursor to AUDIO and press RETURN.
- 3 Move the cursor to MTS and press RETURN.
- 4 Press  $\Delta$  or  $\nabla$  to select MAIN, SAP, or MONO.
- 5 Press MENU to return to the TV program.



| Choose | To  |
|--------|---|
| MAIN   | Listen to stereo sound.                     |
| SAP    | Listen to bilingual and other programs.     |
| MONO   | Reduce noise during poor stereo broadcasts. |

#### Note

- The sound of non-SAP programs will be muted when SAP is selected. If there is no SAP audio, you may hear unrelated audio in English.

### Setting the Speaker Switch (SPEAKER)

**KV-20S30, 20V60, 21RS30C only.**

You may switch off the TV speakers when you want to listen to the TV sound through a separate stereo system.

- 1 Press MENU.
- 2 Move the cursor to AUDIO and press RETURN.
- 3 Move the cursor to SPEAKER and press RETURN.
- 4 Press  $\Delta$  or  $\nabla$  to select ON or OFF.
- 5 Press MENU to return to the TV program.



| Choose | To   |
|--------|--|
| ON     | Listen to the sound from the TV.   |
| OFF    | Turn off the TV speaker and listen to the TV's sound through external audio system speakers. |

### Changing Audio Out Speaker Volume

**KV-20S30, 20V60, 21RS30C only.**

You can control the volume of the TV program when you play the TV sound through a separate stereo system.

- 1 Press MENU.
- 2 Move the cursor to AUDIO and press RETURN.
- 3 Move the cursor to SPEAKER and press RETURN.
- 4 Press  $\Delta$  or  $\nabla$  to set SPEAKER to OFF. Press RETURN.

- 5 Move the cursor to FIXED or VARIABLE and press RETURN. Your selection will turn yellow.
- 6 Press MENU to return to the TV program.



| Choose   | To                                  |
|----------|-------------------------------------|
| FIXED    | Adjust the volume with your stereo. |
| VARIABLE | Adjust the volume through the TV.   |

#### Note

- Set the volume on your stereo low when switching from VAR to FIXED to avoid overloading your speakers.

### Turning on Surround Sound

**KV-20V60 only**

Use this feature to listen to TV audio in Surround Sound mode.

- 1 Press MENU.
- 2 Move the cursor ( $\blacktriangleright$ ) to AUDIO and press RETURN.
- 3 Move the cursor to SURROUND and press RETURN.
- 4 Press  $\Delta$  or  $\nabla$  to set Surround ON or OFF.
- 5 Press MENU to return to the TV program.



### Adjusting Treble, Bass, and Balance

**KV-20V60 only**

- 1 Press MENU.
- 2 Move the cursor ( $\blacktriangleright$ ) to AUDIO and press RETURN.
- 3 Move the cursor to TREBLE, BASS, or BALANCE and press RETURN.



| Choose  | To                                      |
|---------|---|
| TREBLE  | Increase or decrease high pitch sounds. |
| BASS    | Increase or decrease low pitch sounds.  |
| BALANCE | Change the balance between speakers.    |

- 4 Press  $\Delta$  or  $\nabla$  to increase or decrease the setting.
- 5 Press RETURN to make other audio adjustments.
- 6 Press MENU to return to the TV program.

#### Restoring the Factory Audio Settings

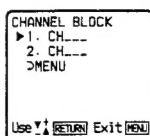
- 1 To restore the factory audio settings, press RESET while the AUDIO menu is displayed.

### Blocking Out a Channel (CHANNEL BLOCK)

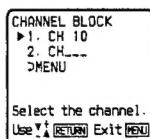
This feature allows you to prevent children from watching selected channels.

- 1 Press MENU.
- 2 Move the cursor to SET UP and press RETURN.
- 3 Move the cursor to CHANNEL BLOCK and press RETURN.

- 4 Move the cursor to 1 or 2 and press RETURN.



- 5 Press Δ+ or ∇- to select the channel that you want to block. Press RETURN.



- 6 Repeat steps 4 and 5 to enter the second channel that you want to block.

- 7 Press MENU to return to the TV program.

If you switch to the blocked channel, BLOCKED appears. The screen is black and the sound is muted.

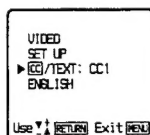
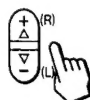
To cancel a CHANNEL BLOCK setting

- Follow steps 1-4 above.
- Press RESET.

### Selecting a Caption Vision Option

Caption Vision options include CC1, 2, 3, and 4, or TEXT1, 2, 3, and 4. CC1, 2, 3, and 4 show a caption or printed version of the dialog or sound effects of a program. CC1 will be the setting for most programs. TEXT1, 2, 3, and 4 show text information on half of the screen. This text is not usually related to the program.

- Press MENU.
- Press Δ+ or ∇- to select [CC/TEXT: CC1] and press RETURN.



- Press Δ+ or ∇- to select the caption type (CC1, 2, 3, 4, or TEXT1, 2, 3, or 4) and press RETURN.
- Press MENU to return to the TV program.
- To view Caption Vision, press DISPLAY several times until CC1, 2, 3, 4, or TEXT1, 2, 3, 4 ON is displayed if broadcasting. The caption will appear in a few seconds.
- To turn off Caption Vision, press DISPLAY until DISPLAY OFF appears.

#### Notes

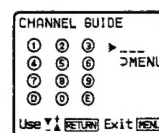
- Captions disappear for a few seconds when you press the MUTING button.
- Captions may appear with a white box or other errors if you have poor reception of the channel.

### Customizing the Channel Number Buttons (CHANNEL GUIDE)

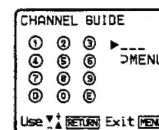
You can assign up to 12 of your favorite channels to Channel Guide locations and switch to them with the Channel Guide.

- Press MENU.
- Press Δ+ or ∇- to select SET UP and press RETURN.
- Press Δ+ or ∇- to select CHANNEL GUIDE and press RETURN.

- 4 Press RETURN again to move the cursor to the number pad.



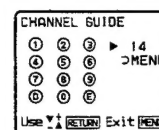
- 5 Press Δ+ or ∇- to select a number on the Channel Guide (the button number will turn red) and press RETURN.



The \_\_\_ turns red.

Buttons 0-9, DISPLAY (D) and ENTER (E) are available for Channel Guide access.

- 6 Press Δ+ or ∇- to select the channel that you want to assign to that button, and press RETURN.



The TV will switch to that channel.

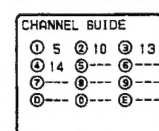
- Repeat steps 5-7 to set other channels.
- Press MENU to return to the current TV program.

To remove a CHANNEL GUIDE setting

- Repeat steps 1-6 to select the channel that you want to remove.
- Press RESET.

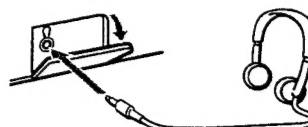
### Using the Channel Guide

- Press CH GUIDE. The Channel Guide shows button numbers and the channels assigned to them.
- Press 0-9, DISPLAY or ENTER on the remote control to switch to the channel you want to view.
- To cancel the CHANNEL GUIDE display without selecting a channel, press CH GUIDE again.



### Listening with Headphones or an Earphone

Plug the headphones or earphone into the jack on the front of the TV. Using headphones will turn off the sound to the TV speakers. KV-13M20 is shown below.

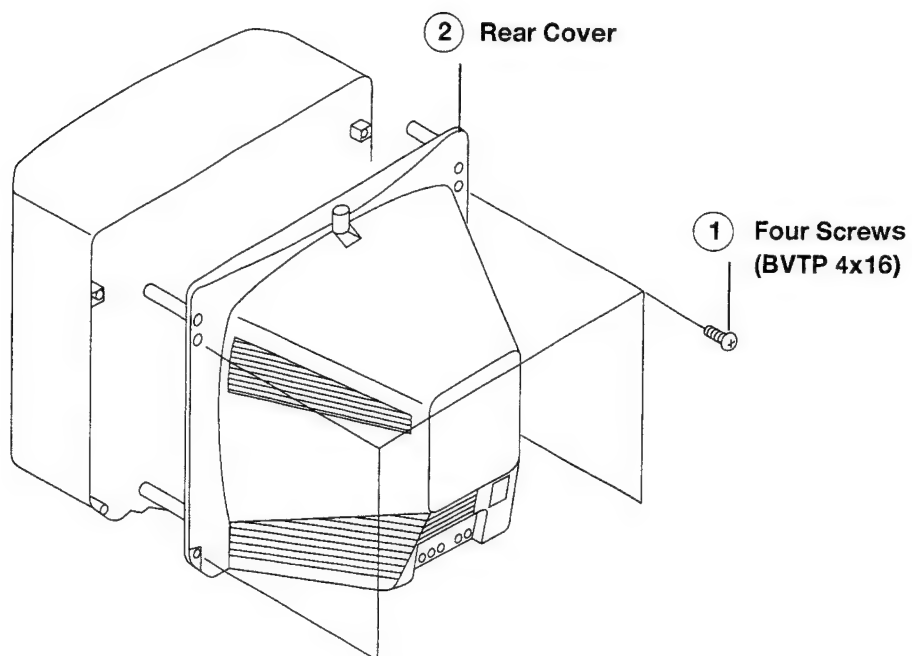


#### Notes

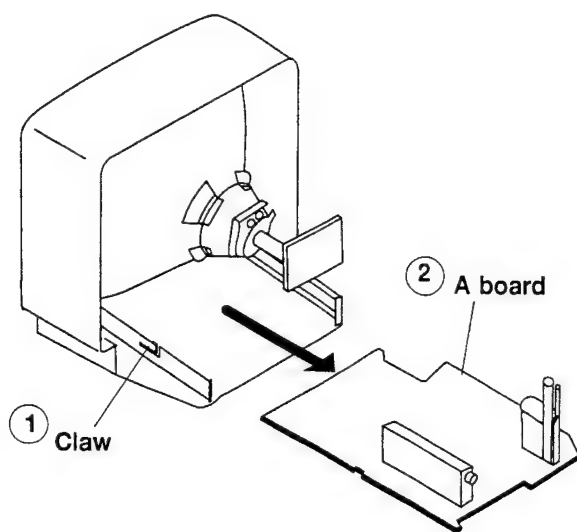
- To prevent hearing damage due to sudden or prolonged excessive volume, do not set the volume too high while listening.
- If your TV is monaural, the monaural sound will be heard from both headphones.

## SECTION 2 DISASSEMBLY

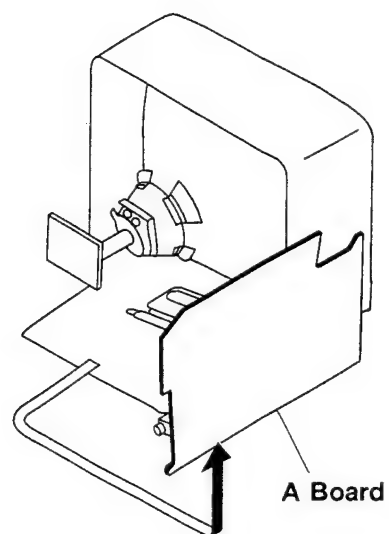
### 2-1. REAR COVER REMOVAL



### 2-2. A BOARD REMOVAL



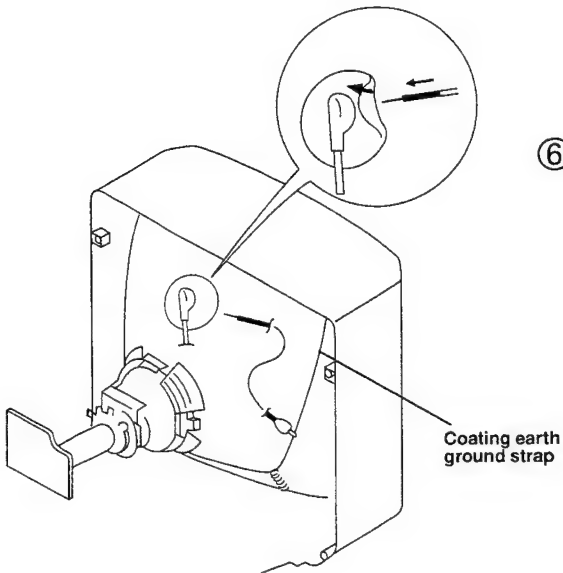
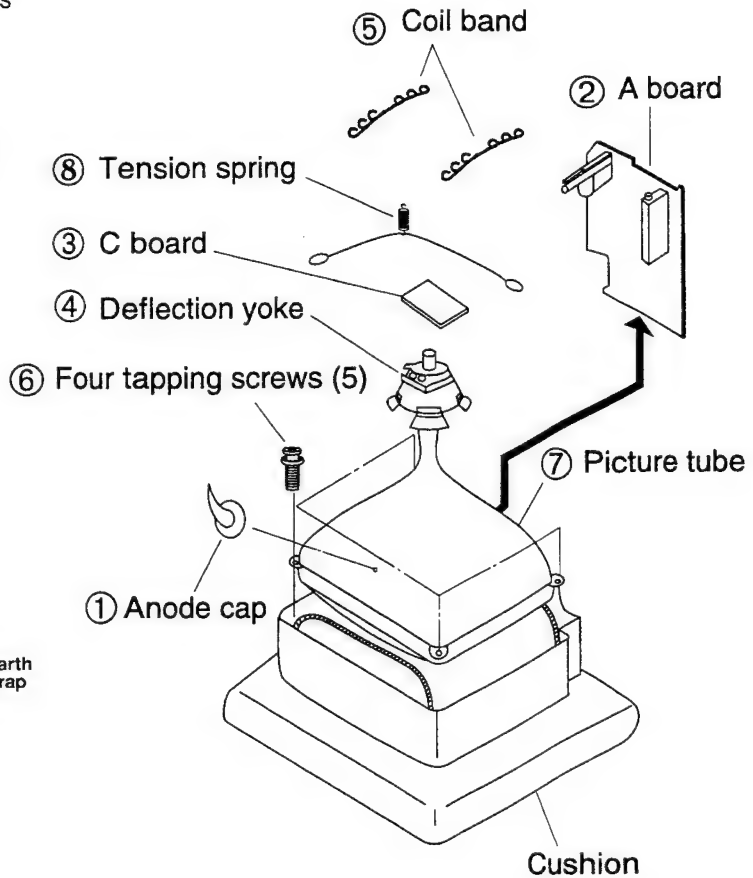
### 2-3. SERVICE POSITION



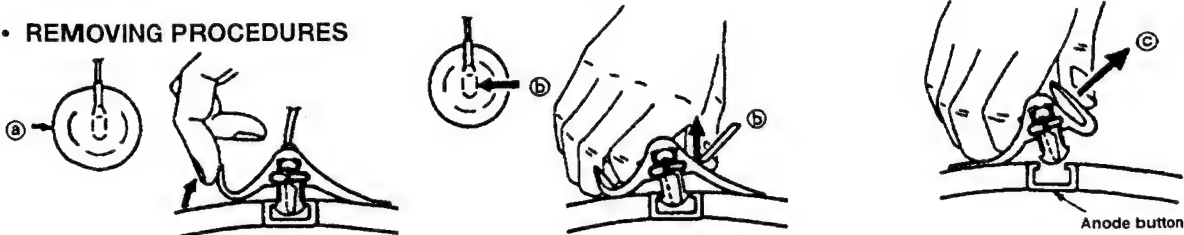
**WARNING Before removing anode cap:**

H.V. remains in the CRT even after the power is disconnected.

To avoid electrical shock before attempting to remove the anode cap, discharge CRT: Short between anode and CRT coating earth ground strap.

**2-4. PICTURE TUBE REMOVAL****• REMOVAL OF ANODE-CAP**

**NOTE:** Short circuit the anode of the picture tube and the anode cap to the metal chassis, CRT shield or carbon painted on the CRT after removing the anode.

**• REMOVING PROCEDURES**

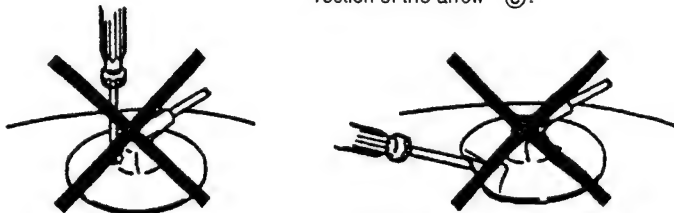
① Turn up one side of the rubber cap in the direction indicated by the arrow ㊸.

② Using a thumb pull up the rubber cap firmly in the direction indicated by the arrow ㊹.

③ When one side of the rubber cap is separated from the anode button, the anode-cap can be removed by turning up the rubber cap and pulling up it in the direction of the arrow ㊺.

**• HOW TO HANDLE AN ANODE-CAP**

- ① Don't damage the surface of anode-caps with sharp shaped material!
- ② Don't press the rubber so as not to damage the inside of anode-caps. A material fitting called a shatter-hook terminal is built into the rubber cap.
- ③ Don't turn over the foot of rubber cap. The shatter-hook terminal will stick out or damage the rubber cap.





## SECTION 3 SET-UP ADJUSTMENTS

- The following adjustments should be made when a complete realignment is required or a new picture tube is installed.
- These adjustments should be performed with rated power supply voltage unless otherwise noted.

The controls and switch should be set as follows unless otherwise noted:

PICTURE control ..... normal

BRIGHTNESS control ..... normal

Perform the adjustments in order as follows:

1. Beam Landing
2. Convergence
3. Focus
4. Screen (G2) and White Balance

**Note:** Test Equipment Required

1. Color bar Pattern Generator
2. Degausser
3. DC Power Supply
4. Digital multimeter

### Preparation:

- Feed in the white pattern signal.
- Before starting, degauss the entire screen.

### 3-1. BEAM LANDING

1. Input a raster signal with the pattern generator.
2. Loosen the deflection yoke mounting screw, and set the purity control to the center as shown in Fig.2.
3. Turn the raster signal of the pattern generator to green.
4. Move the deflection yoke backward, and adjust with the purity control so that green is in the center and red and blue are at the sides evenly. (Fig.3)
5. Move the deflection yoke forward, and adjust so that the entire screen becomes green. (Fig.1)
6. Switch over the raster signal to red and blue and confirm the condition.
7. When the position of the deflection yoke is determined, tighten it with the deflection yoke mounting screw.
8. When landing at the corner is not right, adjust by using the disk magnets. (Fig.4)

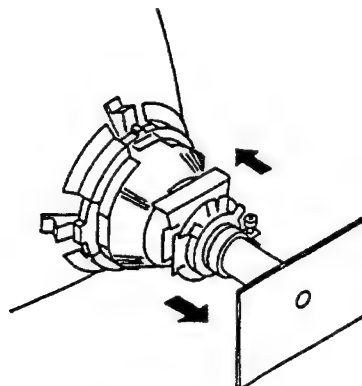


Fig. 1

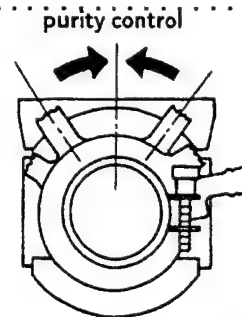


Fig. 2

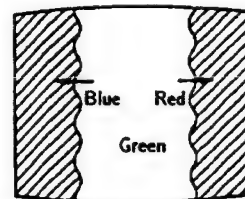


Fig. 3

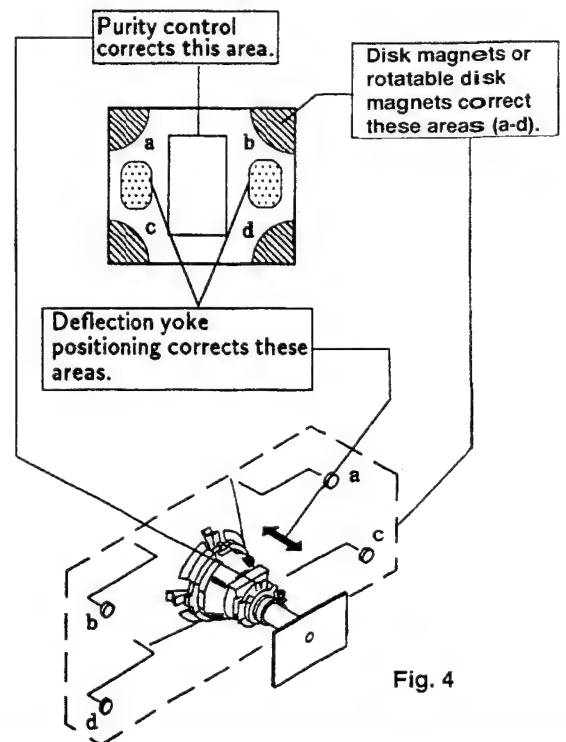


Fig. 4

### 3-2. CONVERGENCE

#### Preparation:

- Before starting, perform FOCUS, V.LIN and V. SIZE adjustments.
  - Set BRIGHTNESS control to minimum.
  - Feed in dot pattern.
- (1) Vertical Static Convergence

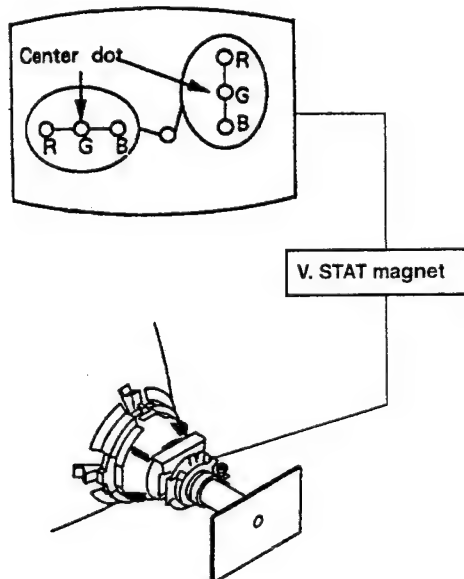
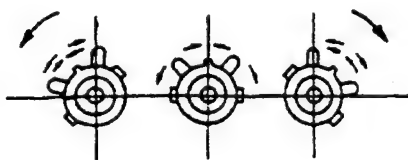
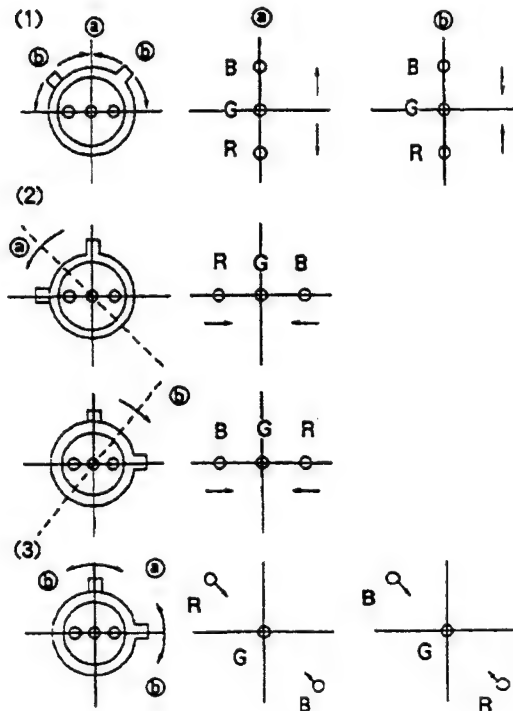


Fig. 5

1. Adjust V. STAT magnet to converge red, green and blue dots in the center of the screen. (Vertical movement)
- Tilt the V. STAT magnet and adjust static convergence to open or close the V. STAT magnet.



2. When the V. STAT magnet is moved in the direction of arrow (a) and (b), red, green, and blue dots move as shown below.



If the blue dot does not converge with red and green dots, perform the following steps:

Move BMC magnet (a) to correct insufficient H.static convergence.

Rotate BMC magnet (b) to correct insufficient V.static convergence.

In either case, repeat Beam Landing Adjustment.

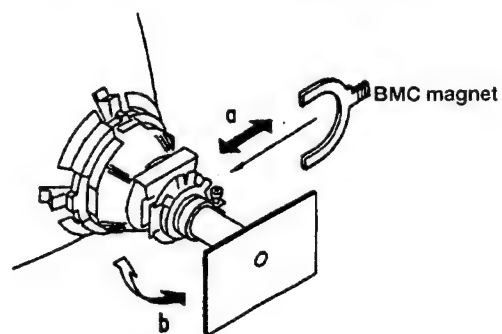


Fig. 6

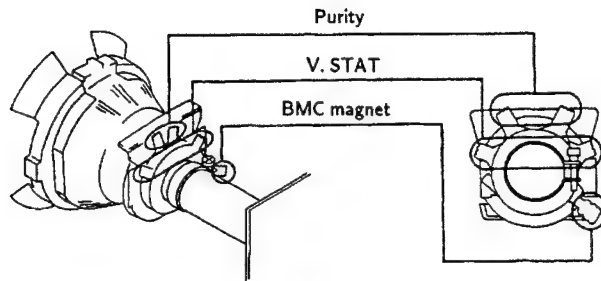


Fig. 7

## (2) Dynamic Convergence Adjustment Preparation:

- Before starting to perform Horizontal and Vertical static convergence Adjustment.
1. Slightly loosen deflection yoke screw.
  2. Remove deflection yoke spacers.
  3. Move the deflection yoke for best convergence as shown below.
  4. Tighten the deflection yoke screw.
  5. Install the deflection yoke spacers.

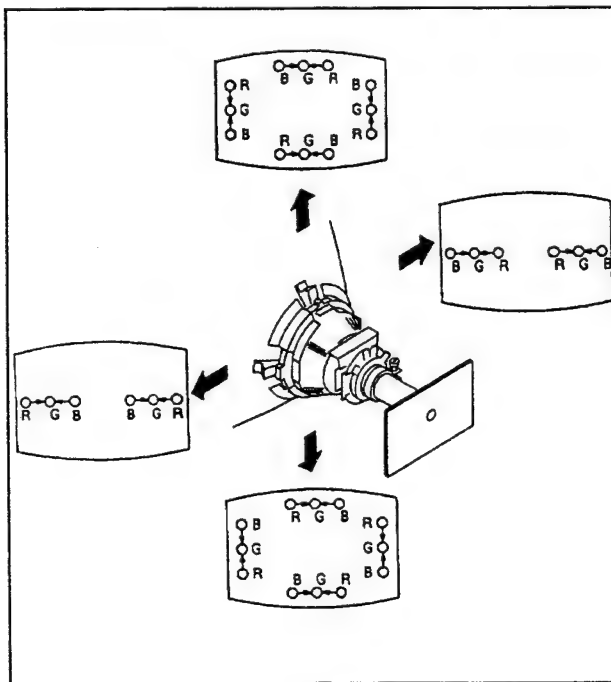


Fig. 8

## (3) Screen-corner Convergence

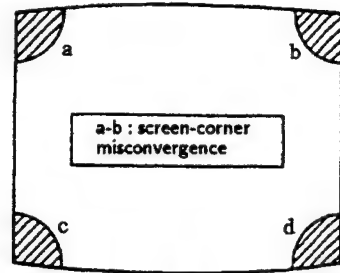
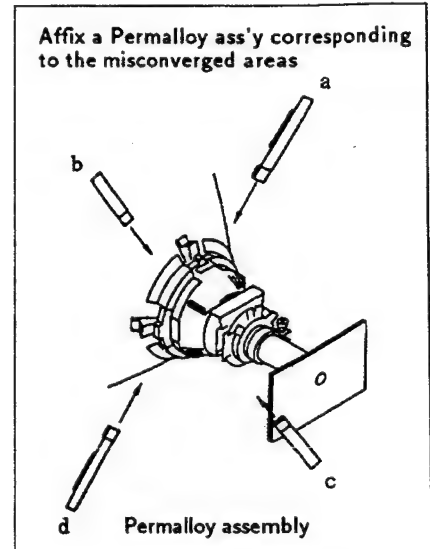


Fig. 9



### 3-3. FOCUS

Adjust FOCUS control for best picture.

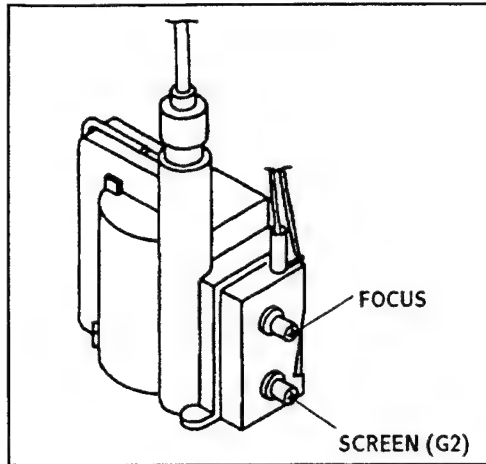


Fig. 10

### 3-4. SCREEN (G2)

1. Input a dots pattern.
2. Set the PIC, BRT controls at minimum and COLOR control at normal.
3. Adjust S BRT, G CUT, B CUT in service mode so that voltages on the red, green, and blue cathodes are 170V dc with an oscilloscope as shown in Fig. 11.
4. Observe the screen and adjust SCREEN (G2) VR to obtain the faintly visible background of dot signal.

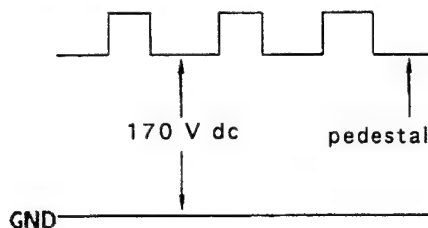


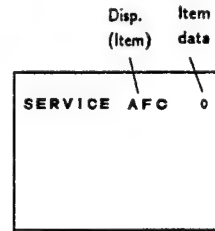
Fig. 11

### 3-5. METHOD OF SETTING THE SERVICE ADJUSTMENT MODE

#### SERVICE MODE PROCEDURE

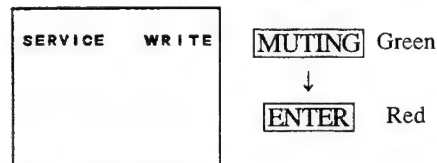
1. Standby mode. (Power off)
2. **DISPLAY** → **5** → **VOL(+)** → **POWER** on the Remote Commander. (Press each button within a second.)

#### SERVICE ADJUSTMENT MODE IN



3. The CRT displays the item being adjusted.
4. Press **1** or **4** on the Remote Commander to select the item.
5. Press **3** or **6** on the Remote Commander to change the data.
6. Press **MUTING** then **ENTER** to write into memory.

#### SERVICE ADJUSTMENT MODE MEMORY



7. Turn set off and on to exit.

### 3-6. WHITE BALANCE ADJUSTMENTS

1. Input an entire white signal.
2. Set to service adjustment mode.
3. Set the PICTURE and BRIGHT to minimum.
4. Adjust with SBRT if necessary.
5. Select G CUT and B CUT with **1** and **4**.
6. Adjust with **3** and **6** for the best white balance.
7. Set the PICTURE and BRIGHT to maximum.
8. Select GDRV and BDRV with **1** and **4**.
9. Adjust with **3** and **6** for the best white balance.
10. Write into the memory by pressing **MUTING** then **ENTER**.

## SECTION 4 SAFETY RELATED ADJUSTMENTS

### A BOARD

#### ☒ R525 CONFIRMATION METHOD (HV HOLD-DOWN CONFIRMATION) AND READJUSTMENTS

The following adjustments should always be performed when replacing the following components (marked with ☒ on the schematic diagram).

IC301, IC502, IC601, D505, D506, D507, D510, DY, C503, C511, C513, C528, R511, R519, R520, R523, R525, R527, R559, R560, R617, R618, T504 (FBT)

#### 1. Preparation before confirmation

- 1) Turn the POWER switch ON. Input an entirely white signal and set the PICTURE and BRIGHT controls to maximum.
- 2) Confirm that the voltage at TP85 is more than 90VDC when the set is operating normally with  $120.0 \pm 2.0$  VAC supply.

#### 2. Hold-down operation confirmation

- 1) Connect the current meter between Pin 11 of the FBT (T504) and the PCB land where Pin 11 would normally attach.
- 2) Input a white signal and adjust the ABL current to be  $1440 \pm 100\mu\text{A}$  using the PICTURE and the BRIGHT controls.
- 3) Confirm the voltage of A board TP-91 is  $113.2 \pm 0.5$  VDC
- 4) Connect the Digital Voltmeter and DC power supply via 1SS119 to TP-85.
- 5) Increase the DC power voltage gradually until the picture blanks out.
- 6) Read the digital voltmeter indication.
- 7) Turn DC power source off immediately.

#### STANDARD

Less than or equal to 127.0 VDC

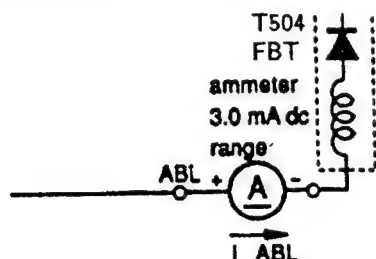
- 8) Input a dot signal and adjust the ABL current to be  $95+100/-95\mu\text{A}$  using the PICTURE and the BRIGHT controls.
- 9) Confirm the voltage of A board TP-91 is  $116.7 \pm 0.5$  VDC
- 10) Repeat steps from (4) to (7).

#### STANDARD

Less than or equal to 127.0 VDC

#### 3. Hold-down readjustment

If the current setting indicated in step 2-2 cannot be met, readjustment should be performed by altering the resistance value of R525 (a component marked with ☒).

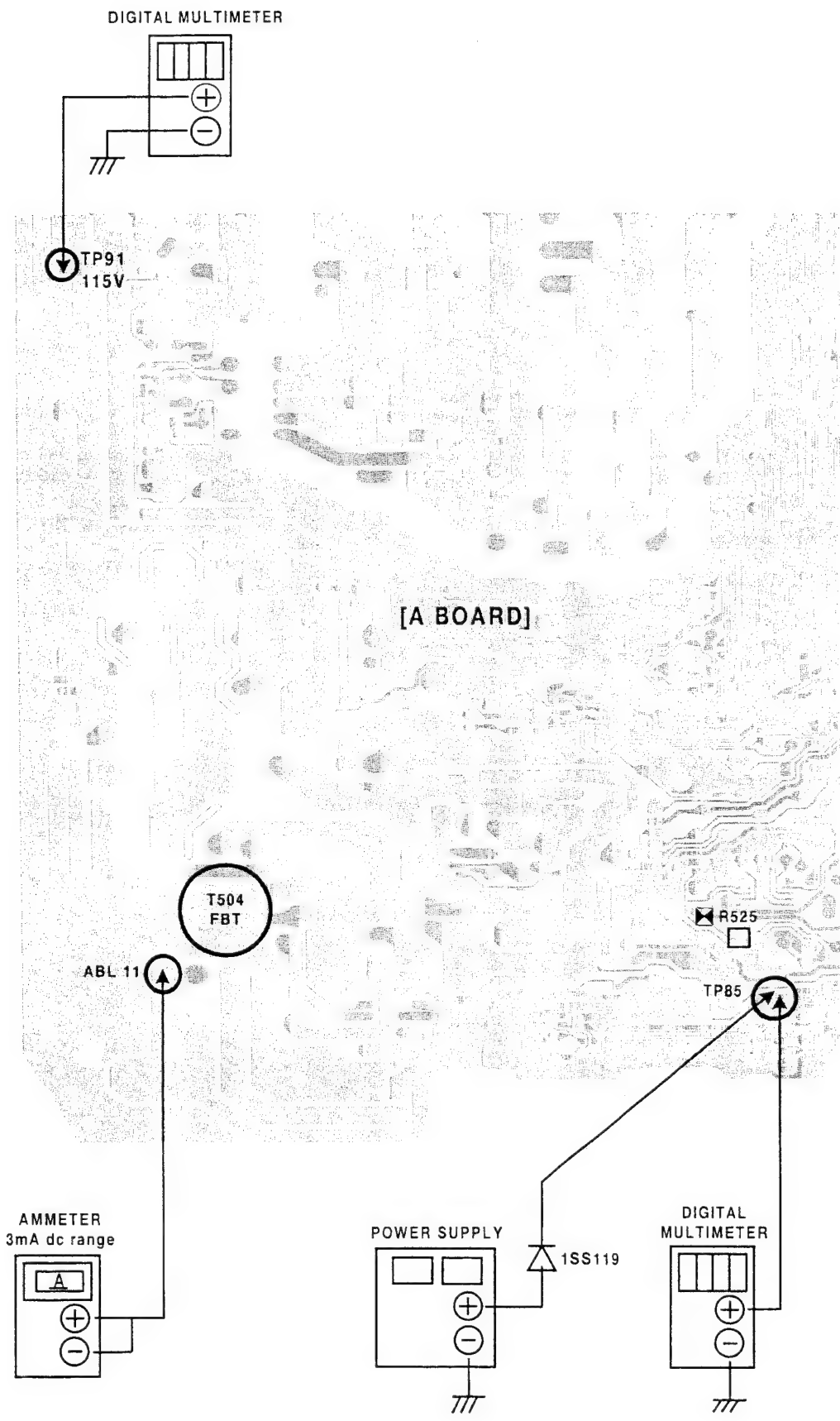


#### B+ VOLTAGE CONFIRMATION AND ADJUSTMENT

The following adjustments should always be performed when replacing the following components (marked with ☒ on the schematic diagram).

IC001, IC601, R030, R617, R618, R629, R630, R651, R652, R654, R655, R656

- 1) Supply  $130 \pm 2.0$  V AC to the set with a variable auto transformer.
- 2) Input a dot signal.
- 3) Set the PICTURE control and the BRIGHT control to minimum condition.
- 4) Set to service adjustment mode.
- 5) Select PADJ with [1] and [4].
- 6) Adjust with [6] to the 0 level.
- 7) Confirm the voltage of A BOARD TP-91 is less than 123.0V DC.
- 8) If step 7) is not satisfied, replace the components, repeat the above steps.
- 9) Supply  $120.0 \pm 2.0$  VAC to the set with a variable auto transformer.
- 10) Adjust with [3] and [6] for the  $116.7 \pm 0.5$  V DC.
- 11) Write into the memory by pressing [MUTING] then [ENTER].



## SECTION 5

### CIRCUIT ADJUSTMENTS

## 5-1. ELECTRICAL ADJUSTMENT BY REMOTE COMMANDER

Use Remote Commander (RM-Y116) to perform circuit adjustments on this model.

NOTE : Test Equipment Required.

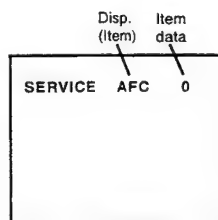
1. Pattern Generator
2. Frequency Counter
3. Digital Multimeter
4. Audio OSC

## 1. METHOD OF SETTING THE SERVICE ADJUSTMENT MODE

## SERVICE MODE PROCEDURE

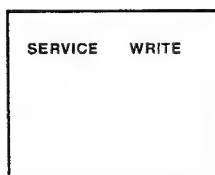
1. Standby mode. (Power off)
2. **DISPLAY** → **5** → **VOL (+)** → **POWER** on the Remote Commander. (Press each button within a second.)

## SERVICE ADJUSTMENT MODE IN



3. The CRT displays the item being adjusted.
4. Press **[1]** or **[4]** on the Remote Commander to select the item.
5. Press **[3]** or **[6]** on the Remote Commander to change the data.
6. Press **[MUTING]** then **[ENTER]** to write into memory.

## SERVICE ADJUSTMENT MODE MEMORY

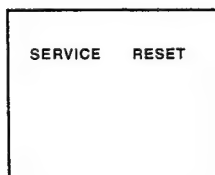


**MUTING** Green

↓

**ENTER** Red

7. Press **8** then **ENTER** on the Remote Commander to initialize.



Carry out step 7) when adjusting IDs 0 to 4 and when replacing and adjusting IC003.

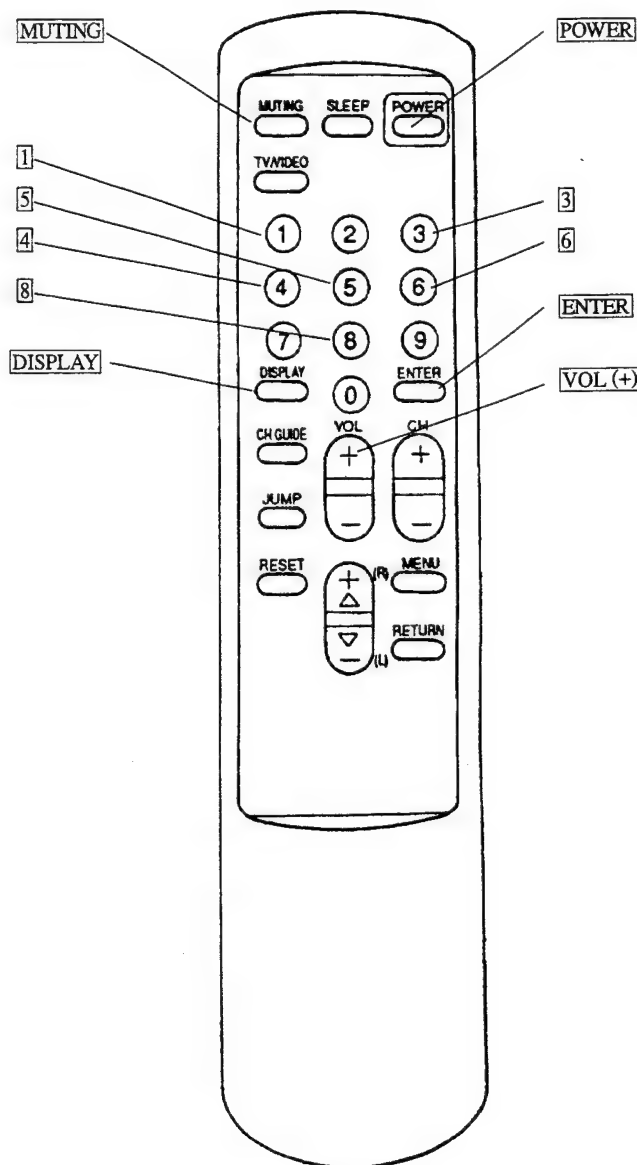
Factory original setting

8. Turn set off and on to exit.

## 2. MEMORY WRITE CONFIRMATION METHOD

1. After adjustment, pull out the plug from the AC outlet, then replace the plug in the AC outlet again.
2. Turn the power switch ON and set to service mode.
3. Call the adjusted items again to confirm they were adjusted.

### 3. ADJUST BUTTONS AND INDICATOR



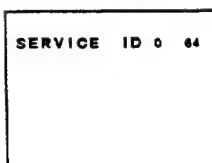
RM-Y116

#### 4. AN ITEM OF ADJUSTMENTS

| No. | Disp. | Item               | Data range | Avg. data |
|-----|-------|--------------------|------------|-----------|
| 1   | SYS   | Color System       | 0~3        | 1         |
| 2   | AFC   | AFC Loop Gain      | 0~3        | *1        |
| 3   | VPOS  | V. Position        | 0~31       | 15        |
| 4   | VSIZ  | V. Size            | 0~63       | 20        |
| 5   | VLIN  | V. Linearity       | 0~15       | 6         |
| 6   | VSCO  | S. Correction      | 0~15       | 7         |
| 7   | HPOS  | H. Position        | 0~15       | 11        |
| 8   | GDRV  | Green-Drive        | 0~31       | 17        |
| 9   | BDRV  | Blue-Drive         | 0~31       | 14        |
| 10  | GCUT  | Green-Cutoff       | 0~15       | 7         |
| 11  | BCUT  | Blue Cut Off       | 0~15       | 7         |
| 12  | TOT   | Chroma TOT-Filter  | 0, 1       | *1        |
| 13  | NR    | Noise Reduction    | 0, 1       | *0        |
| 14  | SCON  | Sub-Contrast       | 0~15       | 6         |
| 15  | SHUE  | Sub-Hue            | 0~15       | 8         |
| 16  | SCOL  | Sub-Color          | 0~15       | 8         |
| 17  | SBRT  | Sub-Brightness     | 0~63       | 34        |
| 18  | SSHP  | Sub-Sharpness      | 0~15       | 11        |
| 19  | RON   | Red-Off            | 0, 1       | *1        |
| 20  | GON   | Green-Off          | 0, 1       | *1        |
| 21  | BON   | Blue-Off           | 0, 1       | *1        |
| 22  | PREL  | Pre-Over Shoot     | 0~7        | 4         |
| 23  | AXIS  | Axis SW            | 0, 1       | 1         |
| 24  | DCOL  | Dynamic-Color      | 0, 1       | *0        |
| 25  | REF   | Reference-Position | 0~3        | 2         |
| 26  | ABLM  | ABL Mode           | 0~3        | 2         |
| 27  | CROM  | Chroma Trap SW     | 0, 1       | 1         |
| 28  | OSDL  | OSD Level          | 0, 1       | 0         |
| 29  | Y-DC  | DC Transmission    | 0~7        | 5         |
| 30  | GAMM  | Gamma              | 0~7        | 0         |
| 31  | VEXT  | V Sync Extend      | 0, 1       | 1         |
| 32  | VZOM  | HV Comp            | 0~7        | 4         |
| 33  | CDMD  | V Countdown        | 0, 1       | 0         |
| 34  | RGBL  | RGB Limit          | 0~3        | 0         |
| 35  | YDLY  | Y Delay            | 0~3        | 0         |
| 36  | SBAL  | Left-Volume        | 0~15       | 7         |
| 37  | SBAS  | Sub-Bass           | 0~15       | 7         |
| 38  | STRE  | Sub-Treble         | 0~15       | 7         |
| 39  | PHOR  | Horizontal Size    | 0~63       | 8         |
| 40  | PE-W  | E-W Correction     | 0~63       | 23        |
| 41  | PCOR  | E-W Corner         | 0~15       | 7         |
| 42  | PTRP  | Trap Correction    | 0~63       | 16        |
| 43  | HCOMP | H Compensation     | 0~15       | 6         |
| 44  | DISP  | Display Position   | 0~63       | 8         |
| 45  | PADJ  | B+ Adjustment      | 0~63       | 34        |
| 46  | ID-0  | ID-0               | 0~256      | by Model  |
| 47  | ID-1  | ID-1               | 0~256      | by Model  |
| 48  | ID-2  | ID-2               | 0~256      | by Model  |
| 49  | ID-3  | ID-3               | 0~256      | by Model  |
| 50  | ID-4  | ID-4               | 0~256      | by Model  |

\* : Set-up value

Note: No.1 through 50 show adjustment order.



Note: IC001 on circuit board A inputs a V. sync signal to pin ⑤ and is always in operation. If a V. sync signal is input to pin ⑤ there will be a waiting period of 2-4 seconds, and the power is shut off.  
When entering the service mode, the above function is cancelled and operation is possible.

Adjust the function values as shown below when IC003 on A board is replaced.

KV-20M20 (CND)

| No. | Disp. | Data |
|-----|-------|------|
| 46  | ID-0  | 9    |
| 47  | ID-1  | 1    |
| 48  | ID-2  | 0    |
| 49  | ID-3  | 0    |
| 50  | ID-4  | 23   |

KV-20M20 (US)

| No. | Disp. | Data |
|-----|-------|------|
| 46  | ID-0  | 25   |
| 47  | ID-1  | 1    |
| 48  | ID-2  | 0    |
| 49  | ID-3  | 0    |
| 50  | ID-4  | 23   |

KV-20S20 (CND)

| No. | Disp. | Data |
|-----|-------|------|
| 46  | ID-0  | 9    |
| 47  | ID-1  | 1    |
| 48  | ID-2  | 3    |
| 49  | ID-3  | 1    |
| 50  | ID-4  | 23   |

KV-20S20/20S21 (US)

| No. | Disp. | Data |
|-----|-------|------|
| 46  | ID-0  | 25   |
| 47  | ID-1  | 1    |
| 48  | ID-2  | 3    |
| 49  | ID-3  | 1    |
| 50  | ID-42 | 23   |

KV-21RS20(E)/21SD1/21PS1(MEX)

| No. | Disp. | Data |
|-----|-------|------|
| 46  | ID-0  | 25   |
| 47  | ID-1  | 1    |
| 48  | ID-2  | 3    |
| 49  | ID-3  | 3    |
| 50  | ID-42 | 23   |

KV-20S30 (CND)

| No. | Disp. | Data |
|-----|-------|------|
| 46  | ID-0  | 9    |
| 47  | ID-1  | 3    |
| 48  | ID-2  | 11   |
| 49  | ID-3  | 1    |
| 50  | ID-4  | 23   |

KV-20S30 (US)

| No. | Disp. | Data |
|-----|-------|------|
| 46  | ID-0  | 25   |
| 47  | ID-1  | 3    |
| 48  | ID-2  | 11   |
| 49  | ID-3  | 1    |
| 50  | ID-4  | 23   |

KV-21R20(E)/21RD1/21PM1(MEX)

| No. | Disp. | Data |
|-----|-------|------|
| 46  | ID-0  | 25   |
| 47  | ID-1  | 1    |
| 48  | ID-2  | 0    |
| 49  | ID-3  | 2    |
| 50  | ID-4  | 23   |



## 5-2. A BOARD ADJUSTMENTS

### RF AGC ADJUSTMENT (IF BLOCK VR)

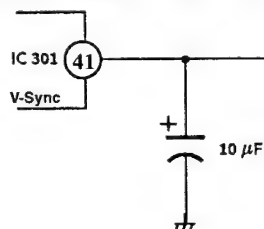
1. Input a color-bar signal.
2. Adjust AGC VR of TU101 so that snow, noise, and cross-modulation disappear from the picture.
3. Verify picture quality on each channel.

### H. FREQUENCY ADJUSTMENT

1. Input a monoscope signal.
2. Set to Service adjustment Mode.
3. Connect a frequency counter to base of Q550 (TP-86 H. DRIVE)
4. Select the item of AFC, set to 3 level (free run).
5. Check H. frequency for the  $15734 \pm 60$  Hz.
6. Select the item of AFC again, adjust the level "0".
7. Write into the memory by pressing **MUTING** then **ENTER**.

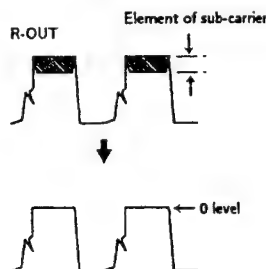
### V. FREQUENCY ADJUSTMENT

1. Select video 1 with no signal input.
2. Set the conditions with standard setting.
3. Connect a capacitor (10  $\mu$ F) across pin (4) of IC301 (V. SYNC) and ground.
4. Connect the frequency counter across CN501 VDY (+) connector and ground.
5. Check V. frequency for the  $59 \pm 0.5$  Hz
6. Disconnect a capacitor form IC301.



### CHROMA TRAP ADJUSTMENT (CROM)

1. Input a red signal.
2. Set to Service adjustment Mode.
3. Connect an oscilloscope CN703 Pin (1) (R OUT) of C board ground.
4. Select CROM with [1] and [4].
5. Adjust with [3] and [6] for the 0 level.



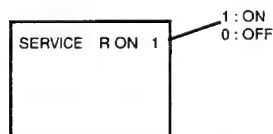
6. Write into the memory by pressing **MUTING** then **ENTER**.

### SUB CONTRAST ADJUSTMENT (SCON)

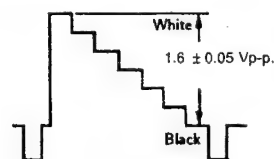
1. Input a color-bar signal.
2. Select the red color.
3. Set to Service adjustment Mode.
4. Set the conditions as follows.

PICTURE ..... MAX  
COLOR ..... MIN  
BRIGHT ..... CENTER

R ON ..... ON (1)  
G ON ..... OFF (0)  
B ON ..... OFF (0)



5. Connect an oscilloscope to CN703 Pin (1) (R OUT) of C board and ground.
6. Select SCON with [1] and [4].
7. Adjust with [3] and [6] for the  $1.6 \pm 0.05$  Vp-p.



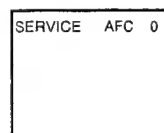
8. Write the memory by pressing **MUTING** then **ENTER**.
9. Return the following back to normal after adjustment.

PICTURE ..... MAX  
COLOR ..... CENTER  
BRIGHT ..... CENTER

R ON ..... ON (1)  
G ON ..... ON (1)  
B ON ..... ON (1)

### DISPLAY POSITION ADJUSTMENT (DISP)

1. Input a color-bar signal.
2. Set to Service adjustment Mode.
3. Select DISP with [1] and [4].
4. Adjust with [3] and [6] for the bar center.
5. Write the memory by pressing **MUTING** then **ENTER**.
6. Check if the text is displayed on the screen.

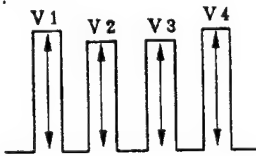


### SUB BRIGHT ADJUSTMENT (SBRT)

1. Input a cross-hatch signal.
2. Set to service adjustment mode.
3. Set the PICTURE and BRIGHT to minimum.
4. Select SBRT with [1] and [4].
5. Adjust with [3] and [6] to obtain a faintly visible cross-hatch.
6. Write into the memory by pressing [MUTING] then [ENTER].

### SUB HUE, SUB COLOR ADJUSTMENT (SHUE, SCOL)

1. Input a color-bar signal.
2. Set to Service adjustment Mode.
3. Connect an oscilloscope to CN703 Pin (3) (B OUT) of C board.
4. Select SHUE and SCOL with [1] and [4].
5. Adjust with [3] and [6] for the  $V1 = V4$  (SCOL) and  $V2 = V3$  (SHUE).



6. After Sub-Color/Hue adjustment, increase 2 steps on (SCOL).
7. Write into the memory by pressing [MUTING] then [ENTER].

### V. SIZE ADJUSTMENT (VSIZ)

1. Input a cross-hatch signal.
2. Set to Service adjustment Mode.
3. Select VSIZ with [1] and [4].
4. Adjust with [3] and [6] for the best vertical size.
5. Write into the memory by pressing [MUTING] then [ENTER].

V. SIZE (VSIZ)



### V. CENTER ADJUSTMENT (VPOS)

1. Input a cross-hatch signal.
2. Set to Service adjustment Mode.
3. Select VPOS with [1] and [4].
4. Adjust with [3] and [6] for the best vertical center.
5. Write into the memory by pressing [MUTING] then [ENTER].

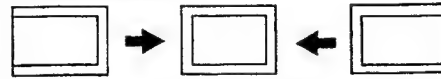
V. CENTER (VPOS)



### H. CENTER ADJUSTMENT (HPOS)

3. Select HPOS with [1] and [4].
4. Adjust with [3] and [6] for the best horizontal center.
5. Write into the memory by pressing [MUTING] then [ENTER].

H. CENTER (HPOS)



### V LINEARITY (VLIN) AND V CORRECTION (VSCO) ADJUSTMENTS.

1. Input a cross-hatch signal.
2. Set to Service adjustment Mode.
3. Select VLIN and VSCO with [1] and [4].
4. Adjust with [3] and [6] for the best picture.
5. Write the memory by Pressing [MUTING] then [ENTER].

V LINEARITY (VLIN)



V CORRECTION (VSCO)



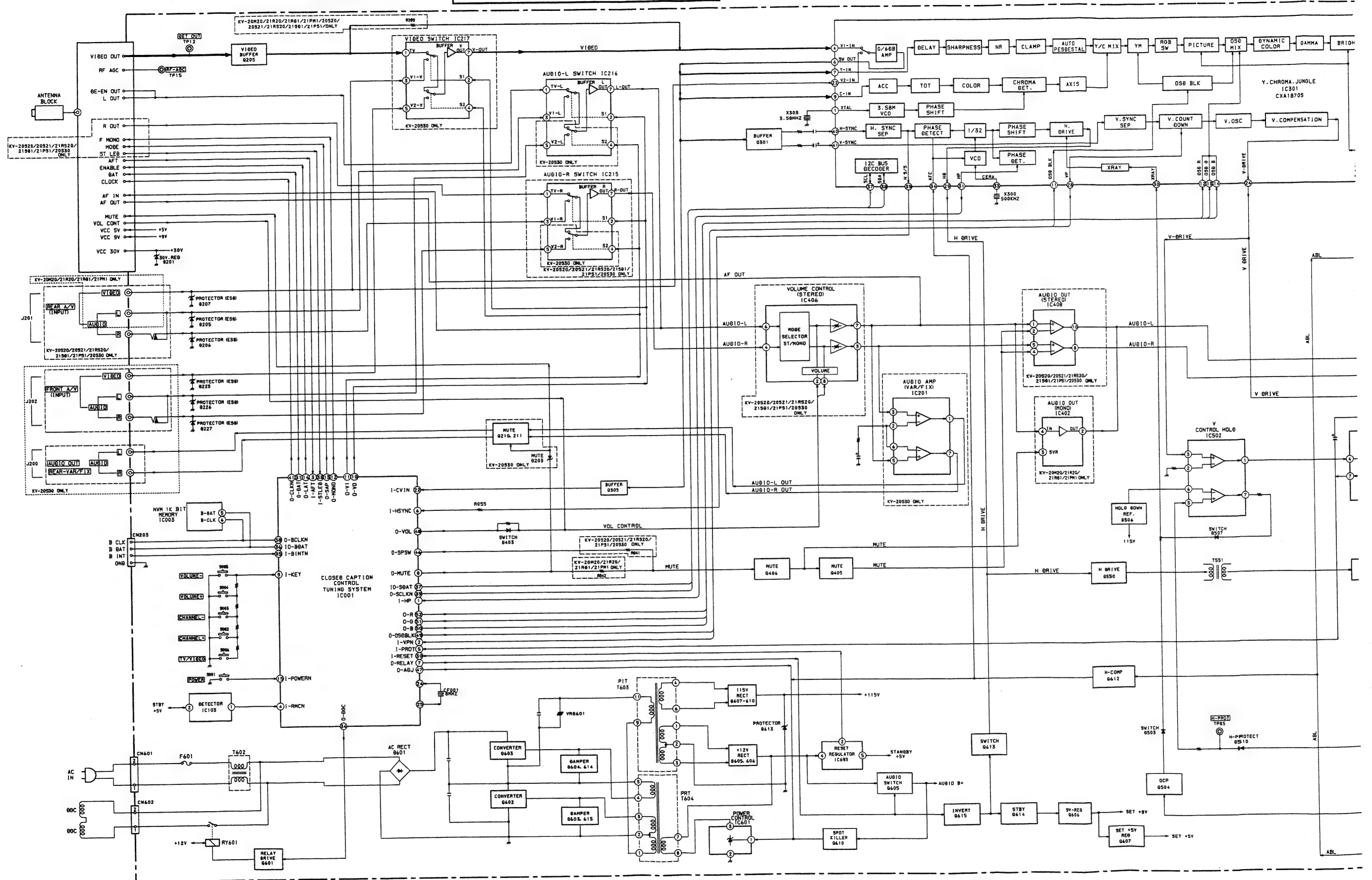
Note : Perform this adjustment after checking H. FREQUENCY.

1. Input a cross-hatch signal.
2. Set the Service adjustment Mode.

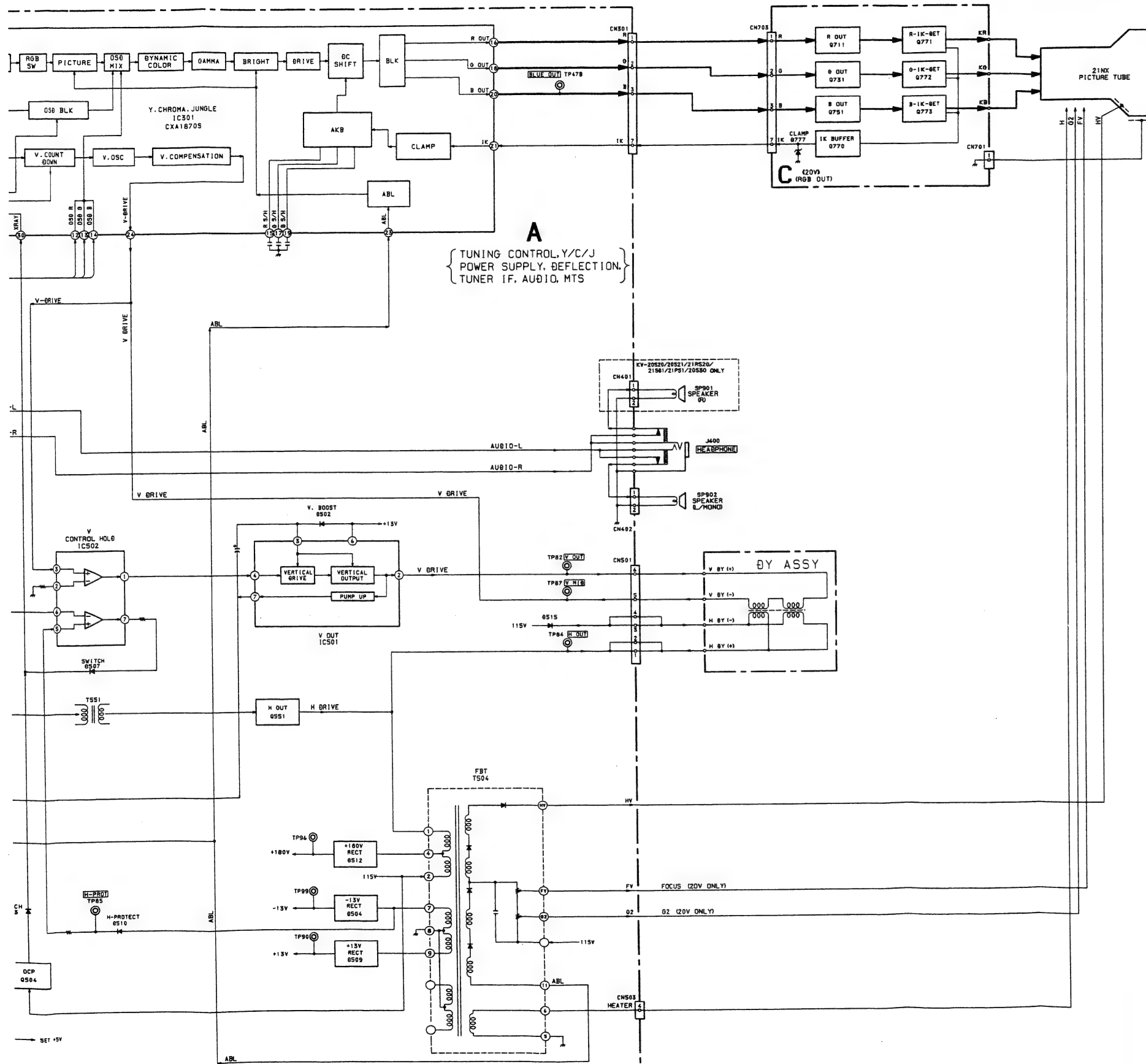
# 6-1. BLOCK DIAGRAMS

## SECTION 6 DIAGRAMS

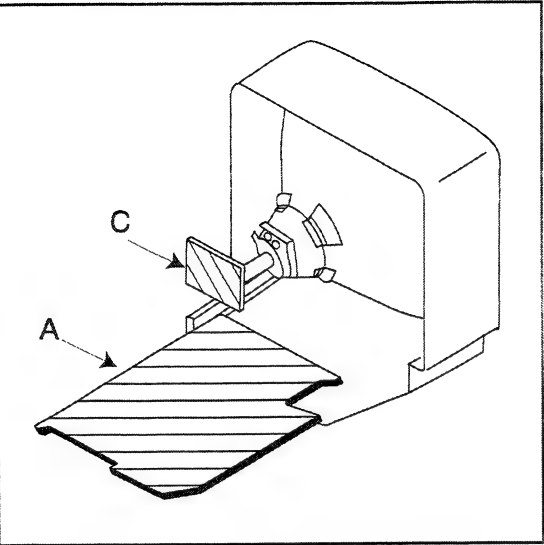
KV-20M20/21R20/21RD1/21PM1/20S20  
KV-20S21/21RS20/21SD1/21PS1/20S30  
RM-Y116



KV-20M20/21R20/21RD1/21PM1/20S20  
KV-20S21/21RS20/21SD1/21PS1/20S30  
RM-Y116



6-2. Circuit Boards Location



6-3. Printed Wiring Boards and Schematic Diagrams

- Note:
- All capacitors are in  $\mu\text{F}$  unless otherwise noted. pF:  $\mu\text{F}$  50V or less are not indicated except for electrolytic and tantalums.
  - All electrolytics are 50V unless otherwise specified.
  - Indication of resistance, which does not have one for rating electrical power, is as follows:

Pitch: 5mm  
Rating electrical power 1/4W

- All resistors are in ohms.  
 $K\Omega=1000\Omega$ ,  $M\Omega=1000K\Omega$
- nonflammable resistor.
- $\Delta$ : internal component.
- panel designation and adjustment for repair.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- The components identified by  $\blacksquare$  in this manual have been carefully factory-selected for each set in order to satisfy regulations regarding X-ray radiation. Should replacement be required, replace only with the value originally used.
- When replacing components identified by  $\blacksquare$  make the necessary adjustments indicated. If results do not meet the specified value, change the component identified by  $\blacksquare$  and repeat the adjustment until the specified value is achieved. (Refer to R525 on pages 17 & 18).
- When replacing parts in the table below be sure to perform the related adjustment.

| Part replaced (■)   | Adjustment (⊠)          |
|---|-------------------------|
| IC301, IC502, IC601, D505, D506, D507, D510, DY, C503, C511, C513, C528, R511, R519, R520, R523, R525, R527, R559, R560, R617, R618, T504 (FBT) | HV Hold-Down (R525)     |
| IC001, IC601, R030, R617, R618, R629, R630, R651, R652, R654, R655, R656  | B+ Voltage Confirmation |

- All voltages are in V.
- Voltage is dc with respect to ground unless otherwise noted.
- Readings are taken with a 1M $\Omega$  digital multimeter.
- Readings are taken with a color-bar signal input.
- Voltage variations may be noted due to normal production tolerance.
- Circled numbers are waveform references.

- B+ Line
- B- Line
- signal path

Reference Information

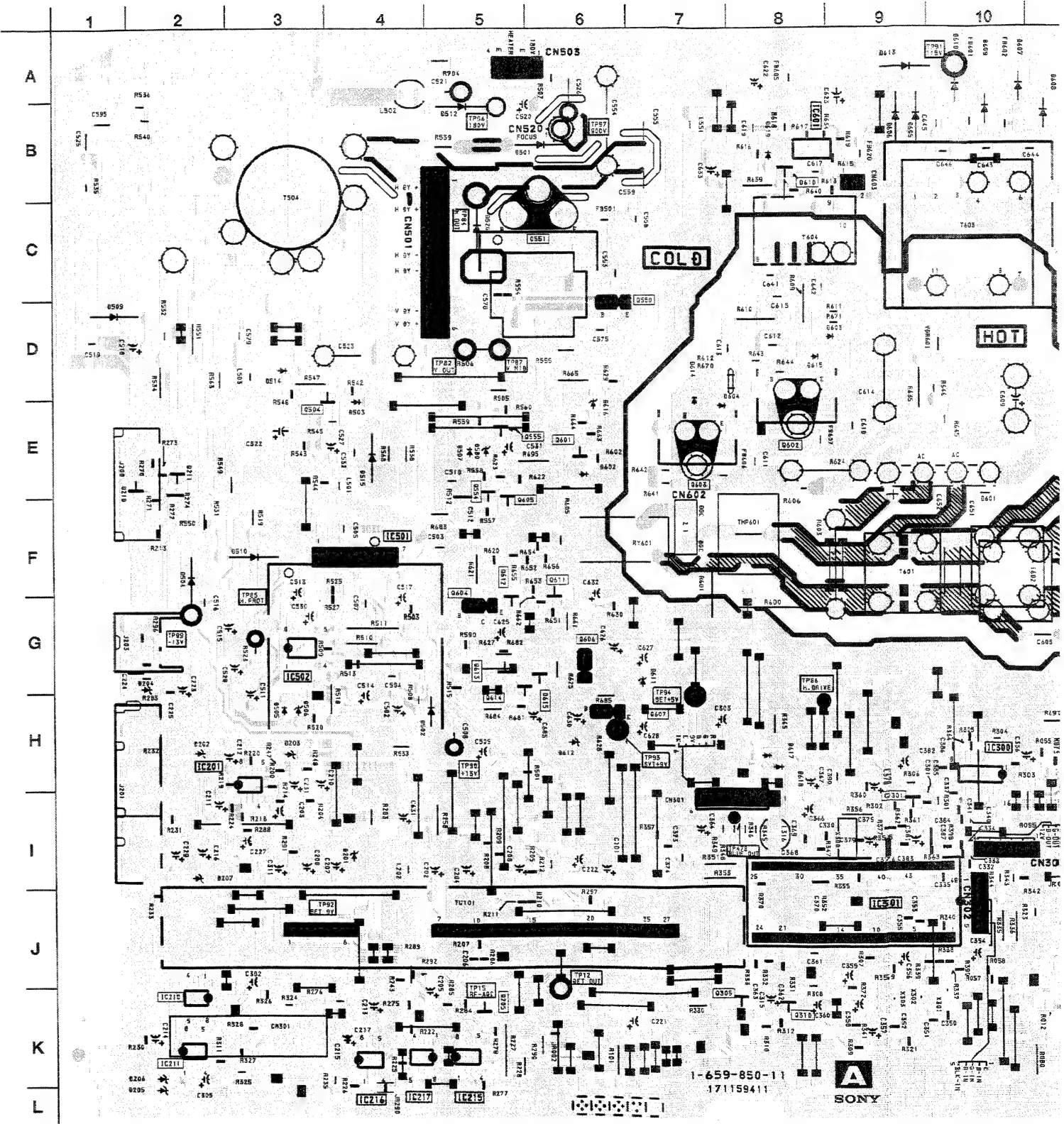
|           |         |                           |
|-----------|---------|---------------------------|
| RESISTOR  | : RN    | METAL FILM                |
|           | : RC    | SOLID                     |
|           | : FPRD  | NON FLAMMABLE CARBON      |
|           | : FUSE  | NON FLAMMABLE FUSIBLE     |
|           | : RW    | NON FLAMMABLE WIREWOUND   |
|           | : RS    | NON FLAMMABLE METAL OXIDE |
|           | : RB    | NON FLAMMABLE CEMENT      |
|           | : X     | ADJUSTMENT RESISTOR       |
| COIL      | : LF-8L | MICRO INDUCTOR            |
| CAPACITOR | : TA    | TANTALUM                  |
|           | : PS    | STYROL                    |
|           | : PP    | POLYPROPYLENE             |
|           | : PT    | MYLAR                     |
|           | : MPS   | METALIZED POLYESTER       |
|           | : MPP   | METALIZED POLYPROPYLENE   |
|           | : ALB   | BIPOLAR                   |
|           | : ALT   | HIGH TEMPERATURE          |
|           | : ALR   | HIGH RIPPLE               |

Note: The symbol  $\blacksquare$  display is on the component side.

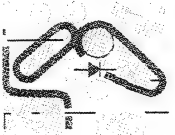
The components identified by shading and mark  $\Delta$  are critical for safety. Replace only with part number specified.

The symbol  $\blacksquare$  indicates fast operating fuse. Replace only with fuse of same rating as marked.

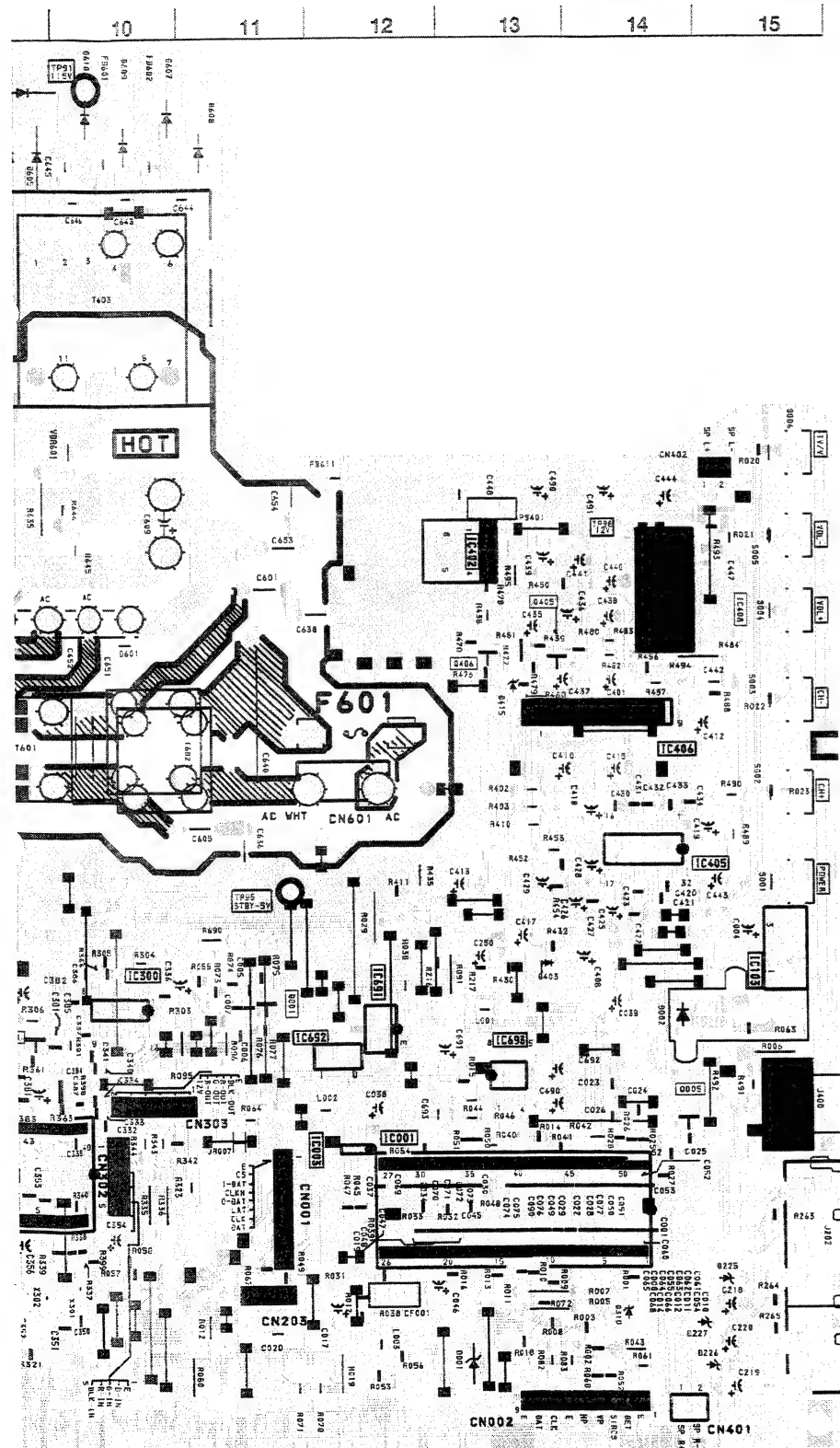
A TUNING CONTROL, Y/C/J, POWER SUPPLY, DEFLECTION, TUNER/IF, AUDIO MTS  
- A BOARD -





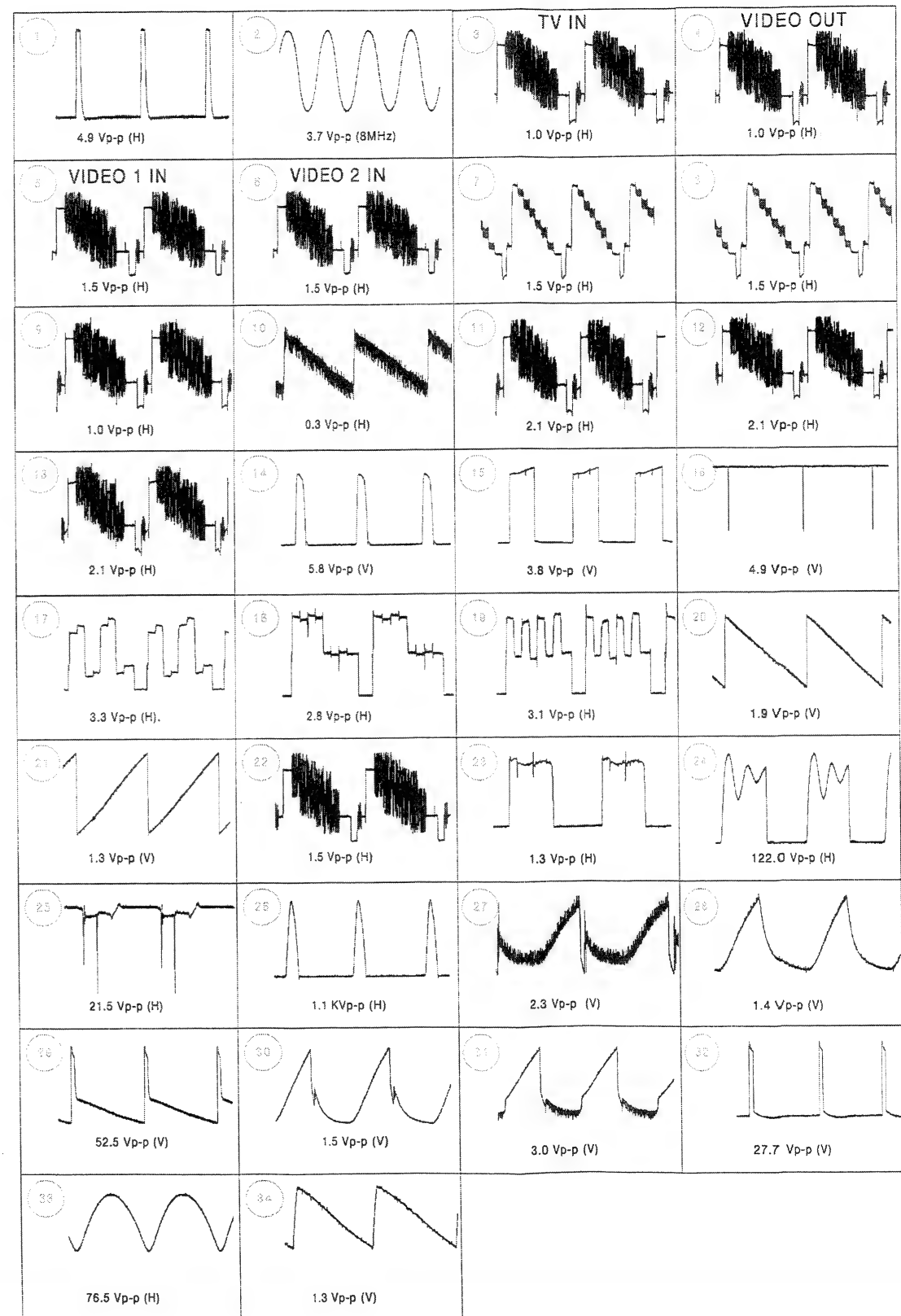


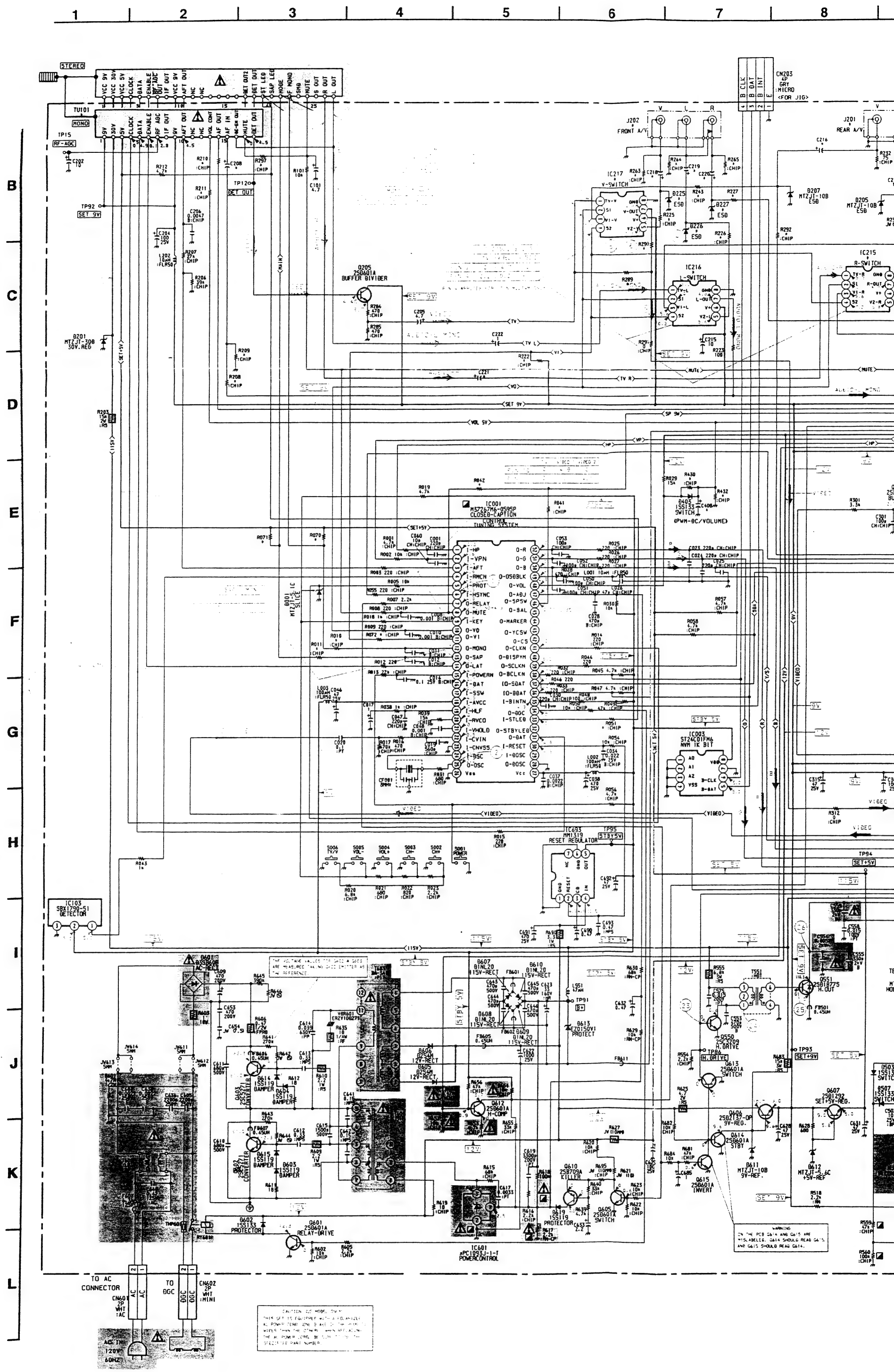
NOTE:  
The circuit indicated as left contains high voltage of over 600Vp-p. Care must be taken to prevent an electric shock during inspection or repair in these areas.

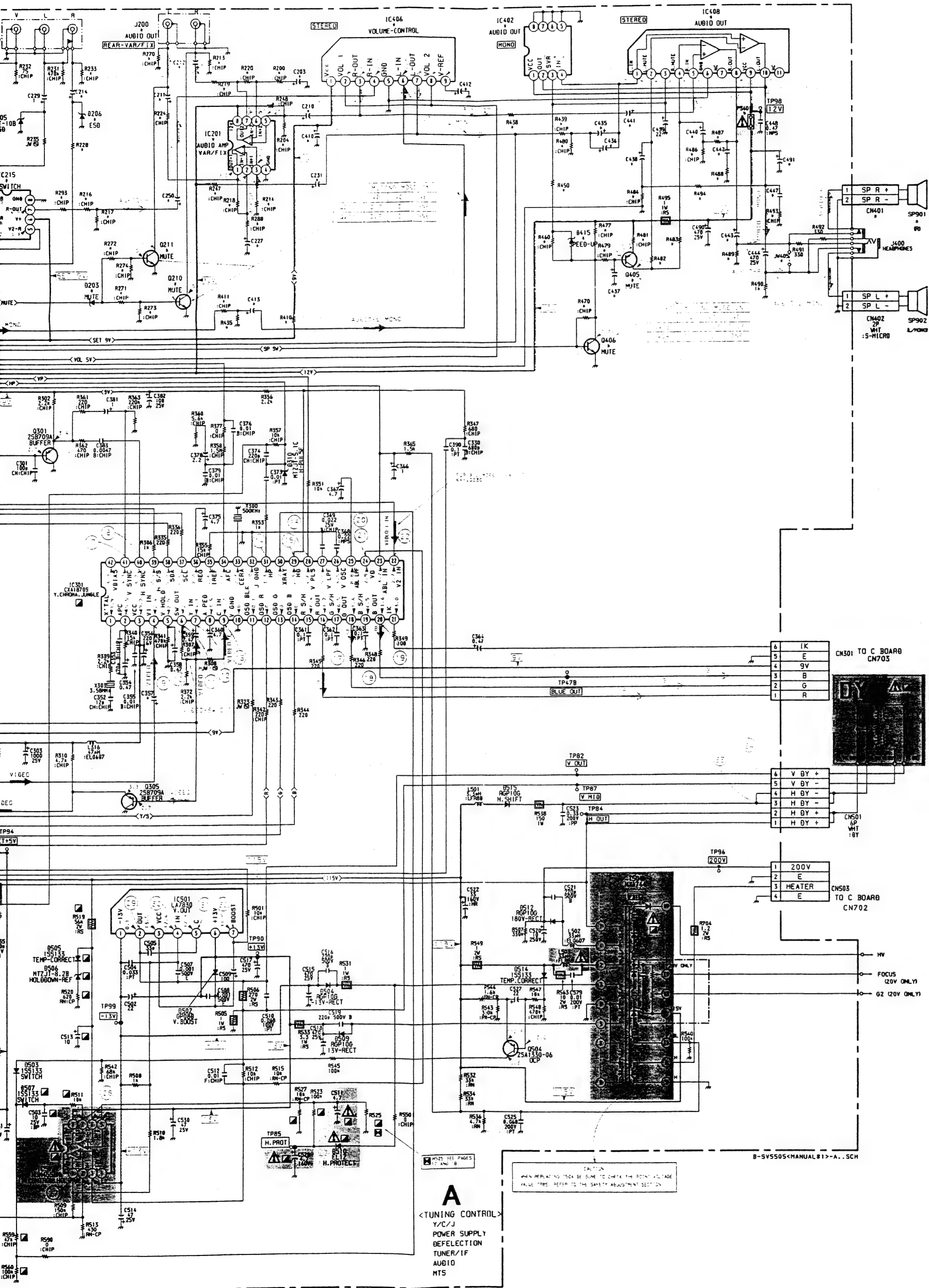


| IC         | DIODE     |
|------------|-----------|
| IC001 I-12 | D001 K-13 |
| IC003 I-11 | D201 I-4  |
| IC103 H-15 | D203 H-3  |
| IC201 H-2  | D205 L-2  |
| IC215 K-5  | D206 L-2  |
| IC216 K-4  | D207 I-2  |
| IC217 K-4  | D225 J-15 |
| IC301 J-9  | D226 K-14 |
| IC402 E-13 | D227 K-14 |
| IC406 F-14 | D310 K-14 |
| IC408 E-15 | D403 H-13 |
| IC501 F-4  | D415 F-13 |
| IC502 G-3  | D502 H-4  |
| IC601 B-8  | D503 E-4  |
| IC693 I-13 | D504 F-2  |
| TRANSISTOR | D505 H-3  |
| Q205 K-5   | D506 H-3  |
| Q210 E-1   | D507 E-5  |
| Q211 E-2   | D509 D-1  |
| Q301 I-9   | D510 F-3  |
| Q305 K-7   | D512 B-5  |
| Q405 E-13  | D514 D-3  |
| Q406 F-13  | D515 E-4  |
| Q504 E-3   | D601 H-10 |
| Q550 D-6   | D602 E-6  |
| Q551 C-5   | D603 D-8  |
| Q601 E-6   | D604 E-7  |
| Q602 E-8   | D605 B-9  |
| Q603 E-7   | D606 B-9  |
| Q605 F-5   | D607 A-10 |
| Q606 G-6   | D608 A-11 |
| Q607 H-7   | D609 B-10 |
| Q610 B-8   | D610 A-10 |
| Q612 F-5   | D611 G-7  |
| Q613 G-5   | D612 H-6  |
| Q614 H-5   | D613 A-9  |
| Q615 H-6   | D614 E-7  |
|            | D615 D-8  |
|            | D619 B-8  |

## A BOARD WAVEFORMS

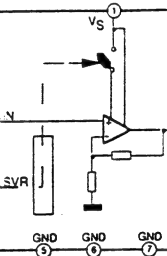




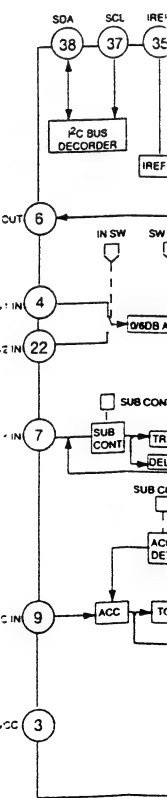


| Ref. No. | Location | KV. 21R2 |
|----------|----------|----------|
| C011     | H-5      |          |
| C012     | H-5      |          |
| C203     | B-11     |          |
| C208     | B-3      |          |
| C210     | B-11     |          |
| C211     | B-10     |          |
| C212     | B-10     |          |
| C214     | B-9      |          |
| C216     | B-8      |          |
| C218     | B-7      |          |
| C219     | B-7      |          |
| C220     | B-7      |          |
| C221     | D-5      |          |
| C227     | C-11     |          |
| C231     | C-11     |          |
| C250     | C-10     |          |
| C357     | G-10     |          |
| C408     | E-7      |          |
| C410     | B-11     |          |
| C412     | B-13     |          |
| C413     | D-11     |          |
| C435     | B-14     |          |
| C436     | B-14     |          |
| C437     | D-14     |          |
| C438     | B-14     |          |
| C440     | B-15     |          |
| C441     | C-14     |          |
| C442     | C-15     |          |
| C443     | C-15     |          |
| C447     | C-15     |          |
| C491     | B-16     | 47       |
| CN401    | C-16     |          |
| D203     | D-10     |          |
| D208     | B-9      |          |
| D225     | B-7      |          |
| D226     | B-7      |          |
| D227     | B-7      |          |
| D415     | C-14     | MT       |
| F601     |          | 6        |

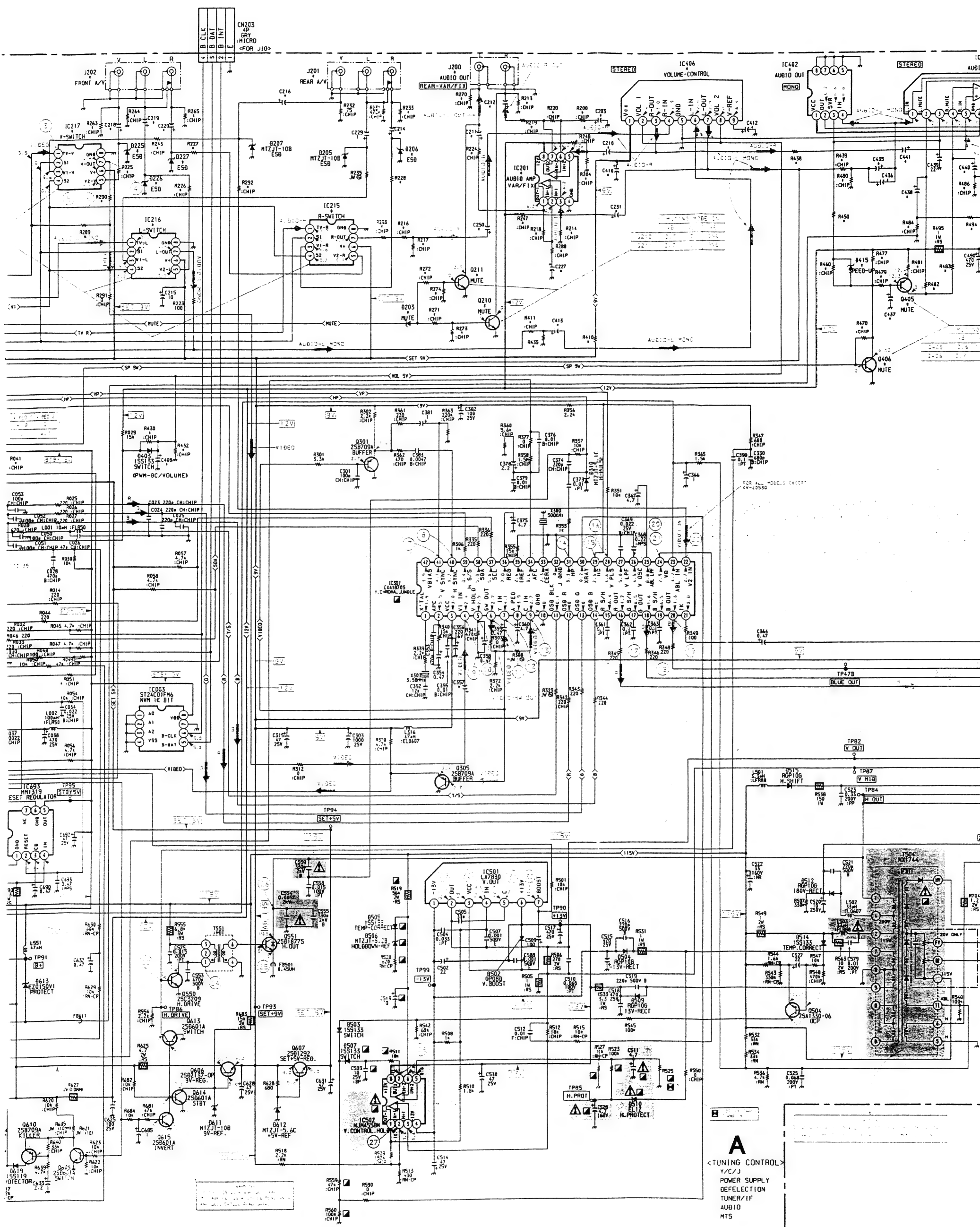
A BOARD IC 402 TDA



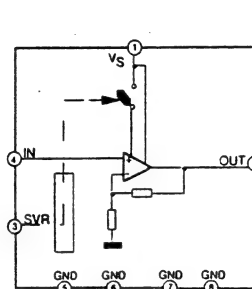
A BOARD IC 301 CXA 1870S



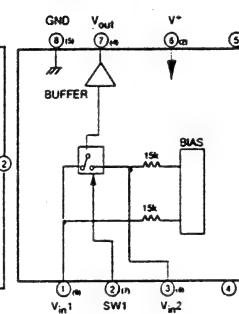




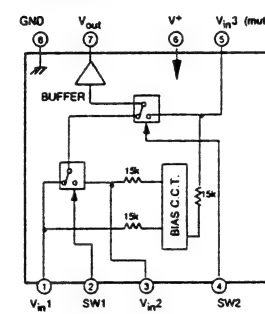
A BOARD IC 402 TDA 7267



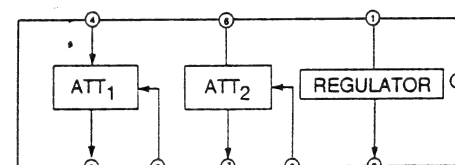
A BOARD IC 215, 216  
NJM2233



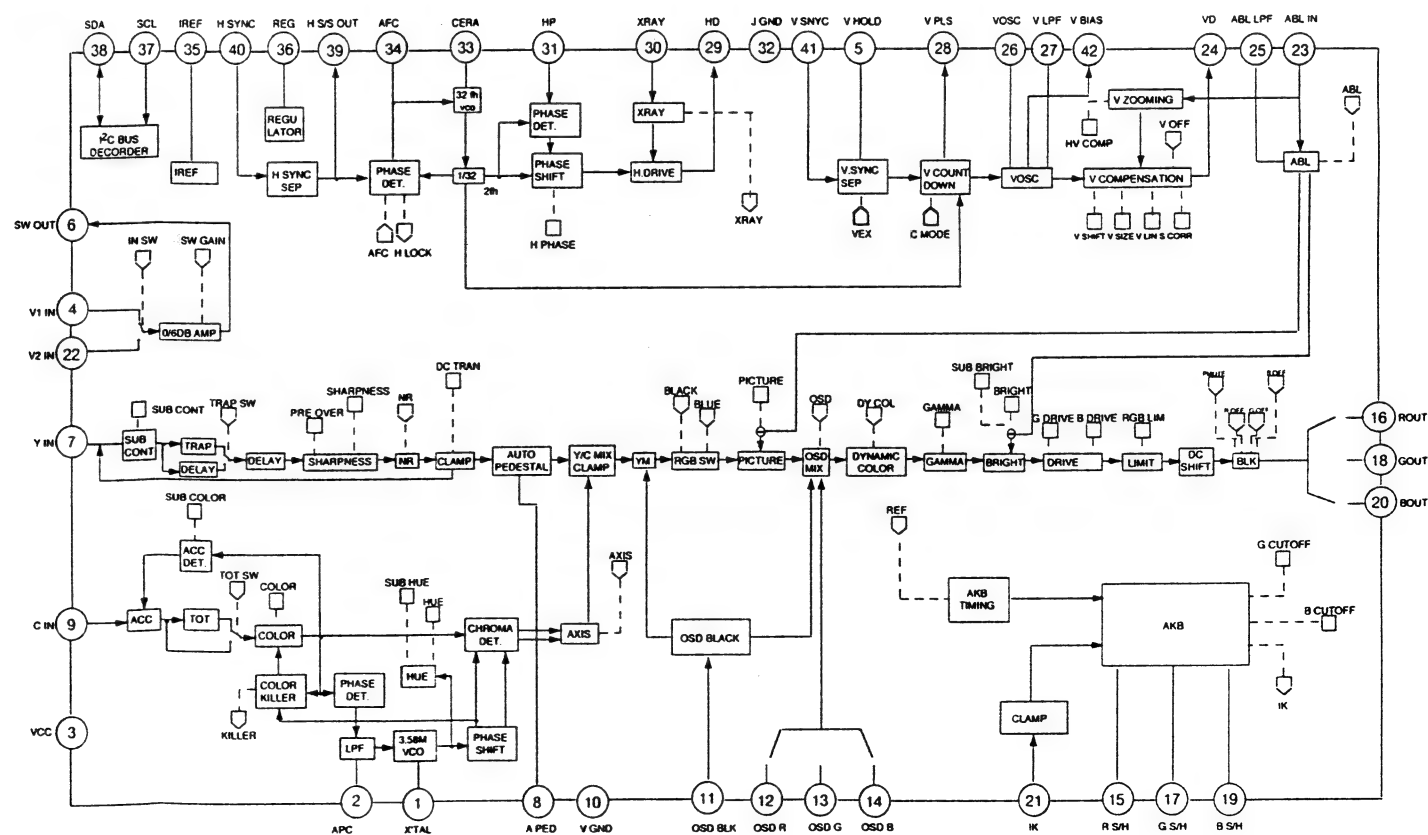
A BOARD IC 215, 216, 217  
NIM 2234

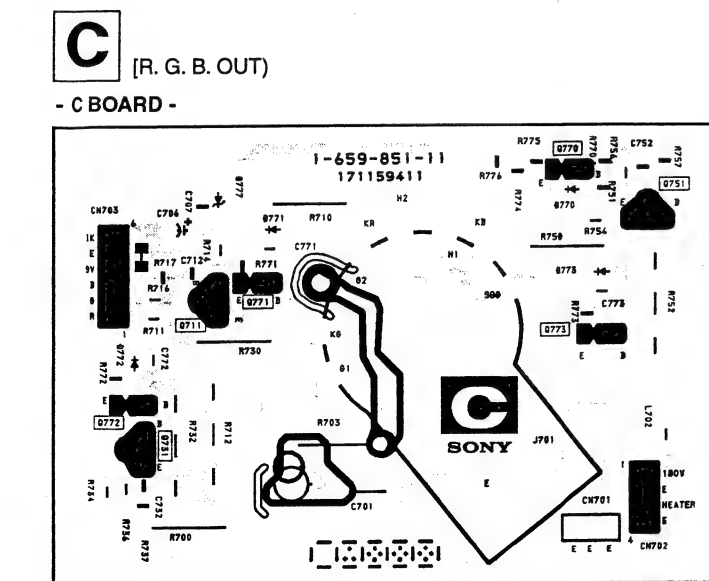


A BOARD IC 406  $\mu$ PC1406HA



A BOARD IC 301 CXA 1870S



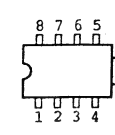


**A** board

|     |             |             |
|-----|-------------|-------------|
| Δ   | 8-738-78-05 | CRS 211K    |
| 8   | 4-365-80-01 | SCREW (5),  |
| 9 Δ | 8-451-44-11 | DR Y211TA   |
| 10  | 4-053-00-01 | SPACER, DY  |
| 11  | 1-452-27-00 | MAGNET, BMC |

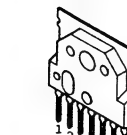
6-4. SEMICONDUCTORS

TDA7267

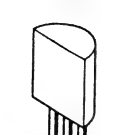


TOP VIEW

LA7830

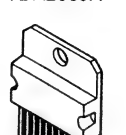


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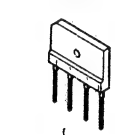
CATHODE  
ANODE

TDA2009A




1SS119-25TD  
1SS133T-77  
MTZJ-T-77-10B  
MTZJ-T-77-2.2  
MTZJ-T-77-3.3B  
MTZJ-T-77-30D  
MTZJ-T-77-5.1C  
MTZJ-T-77-5.6C  
MTZJ-T-77-8.2B

D3SB60F

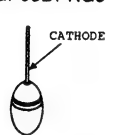


D1NL20-TA  
EL1Z-V1  
RGP10GPKG3



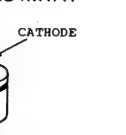
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ANODE

GP08DPKG3



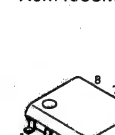
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ANODE

D2S4MTA1

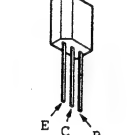


CATHODE  
ANODE

NJM2233BM(TE2)  
NJM2234(TE2)  
NJM4558M-TE2

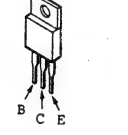


2SD2137-OP-TA



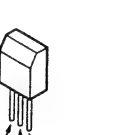
E C B

2SD1877S-SONY-CA



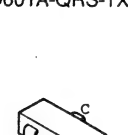
B C E

2SC3209LK-TP  
2SD1292




E C B

2SA1330-T106  
2SB709A-QRS-TX  
2SD601A-QRS-TX



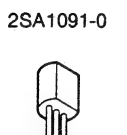
B C E

2SC5271-ROYG-F




B C E

2SA1091-0




E C B

2SC2611




LETTER SIDE  
E C B

2SA1175-HFE



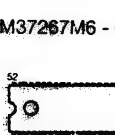
LETTER SIDE  
E C B

SBX1790-51



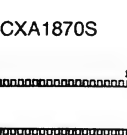
3 2 1

M37267M6 - 059SP



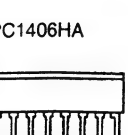
TCP VIEW  
DIP 52PIN

CXA1870S




TOP VIEW  
SDIP 42PIN

uPC1406HA



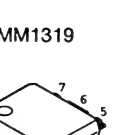
1 2 3 4 5 6 7 8 9

ST24C01FM6TR



(TOP VIEW)

MM1319



7 6 5 4 3 2 1

SECTION 7  
EXPLODED VIEWS

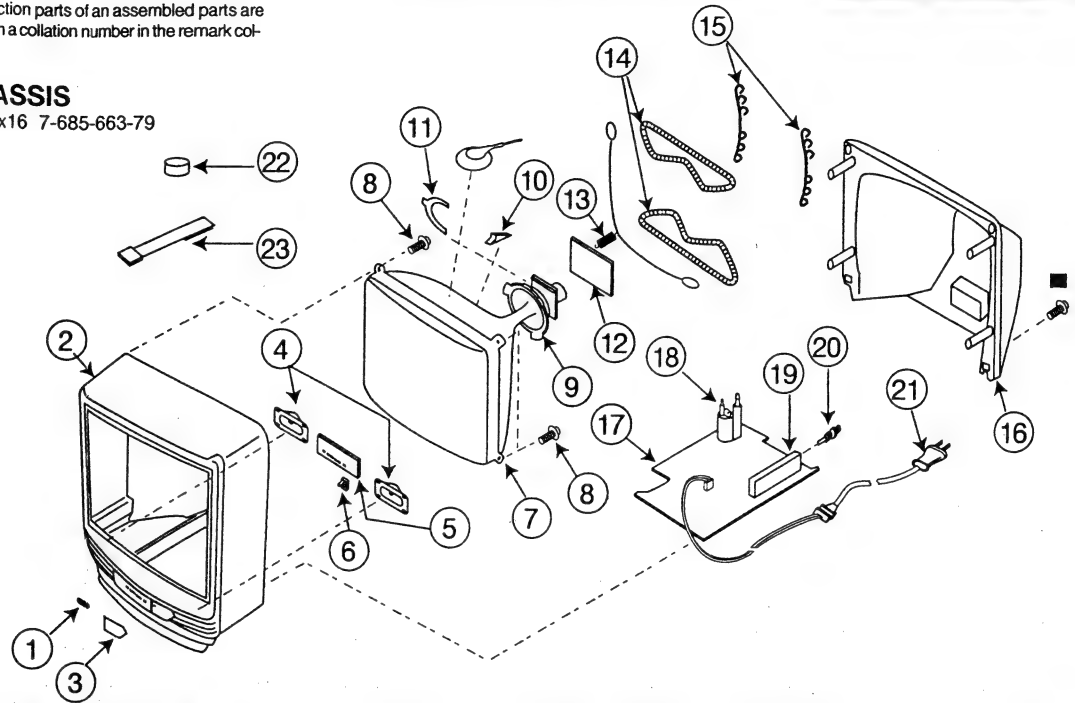
The components identified by shading and mark  $\Delta$  are critical for safety.  
Replace only with part number specified.

NOTE:  
• Items with no part number and no description are not stocked because they are seldom required for routine service.  
• The construction parts of an assembled parts are indicated with a collation number in the remark column.

• Items marked " \* " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

7-1. CHASSIS

■ BVTP 4x16 7-685-663-79



| REF.NO.    | PART NO.     | DESCRIPTION   | REMARK |
|------------|--------------|---|--------|
| 1          | 4-046-161-01 | EMBLEM (NO. 8) SONY   |        |
| 2          | 4-052-638-01 | BEZEL (KV-20S30)  |        |
|            | 4-052-638-21 | BEZEL (KV-21R20)  |        |
|            | 4-052-638-41 | BEZEL (KV-21RS20)   |        |
|            | 4-052-653-01 | BEZEL (KV-20M20/21PM1)  |        |
|            | 4-052-653-11 | BEZEL (KV-21RD1)  |        |
|            | 4-052-656-11 | BEZEL (KV-20S20/21PS1)  |        |
|            | 4-052-656-31 | BEZEL (KV-20S21)  |        |
|            | 4-052-656-41 | BEZEL (KV-21SD1)  |        |
| 3          | 4-052-641-01 | DOOR, CONTROL (KV-21R20/20S20/21RS20/21PS1/20S30)                       |        |
|            | 4-052-641-21 | DOOR, CONTROL (KV-20M20/21PM1)  |        |
|            | 4-052-641-41 | DOOR, CONTROL (KV-20S21)  |        |
|            | 4-052-641-51 | DOOR, CONTROL (KV-21RD1)  |        |
|            | 4-052-641-61 | DOOR, CONTROL (KV-21SD1)  |        |
| 4          | 1-505-265-11 | SPEAKER (9X5CM) (KV-20M20/21RD1/21PM1/21R20)                            |        |
|            | 1-505-266-11 | SPEAKER (9X5CM) (KV-20S30/20S20/20S21/21SD1/21PS1/21RS20)               |        |
| 5          | 4-052-639-01 | BUTTON, MULTI   |        |
|            | 4-052-639-11 | BUTTON, MULTI (KV-20S21 ONLY)   |        |
| 6          | 4-052-640-01 | FILTER, REMOTE  |        |
| 7 $\Delta$ | 8-738-768-05 | CRT 21IN (KV-20M20/21R20/21RD1/21PM1/20S30/20S20(US)/20S21/21SD1/21PS1) |        |
| $\Delta$   | 8-738-781-05 | CRT 21IN (KV-20S20(CND)/21RS20)   |        |
| 8          | 4-365-808-01 | SCREW (5), TAPPING  |        |
| 9 $\Delta$ | 8-451-440-11 | DY Y21N1A   |        |
| 10         | 4-053-005-01 | SPACER, DY  |        |
| 11         | 1-452-277-00 | MAGNET, BMC   |        |

| REF.NO.     | PART NO.     | DESCRIPTION   | REMARK |
|-------------|--------------|---|--------|
| 12 *        | A-1331-518-A | MOUNTED PCB, C  |        |
| 13          | 4-375-394-01 | SPRING, GROUND  |        |
| 14 $\Delta$ | 1-409-707-31 | COIL, DEMAGNETIZATION   |        |
| 15          | 4-369-319-11 | HOLDER, DEGAUSSING COIL   |        |
| 16          | 4-052-642-31 | REAR COVER (KV-20S21)   |        |
|             | 4-052-643-11 | REAR COVER (KV-20S30)   |        |
|             | 4-052-643-31 | REAR COVER (KV-21R20/20M20/21PM1/21RD1)   |        |
|             | 4-052-643-41 | REAR COVER (KV-21RS20/20S20/21PS1/21SD1)  |        |
| 17 *        | A-1297-711-A | COMPLETE (PCB, A) (KV-20M20/21R20/21RD1/21PM1)  |        |
|             | A-1297-712-A | COMPLETE (PCB, A) (KV-20S30)  |        |
|             | A-1297-782-A | COMPLETE (PCB, A) (KV-20S20/20S21/21RS20/21SD1/21PS1)   |        |
| 18 $\Delta$ | 1-453-211-11 | TRANSFORMER ASSY, FLYBACK (NX1744)  |        |
| 19 $\Delta$ | 8-598-339-00 | TUNER BTP-1A402 (KV-20M20/21RD1/21PM1/21R20)  |        |
| $\Delta$    | 8-598-341-00 | TUNER BTP-WA405 (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)   |        |
| 20          | 1-766-374-11 | PLUG, F PIN   |        |
| 21 $\Delta$ | 1-751-057-11 | CORD, POWER (WITH CONNECTOR) 10A/125V (KV-20M20/21R20/21RD1/21PM1/20S20/21RS20/21SD1/21PS1/20S30) |        |
| $\Delta$    | 1-751-058-11 | CORD, POWER (WITH CONNECTOR) 10A/125V (KV-20S21)  |        |
|             | 1-452-032-00 | MAGNET, DISC  |        |
| 23          | X-4308-815-0 | PERMALLOY ASSY, CONVERGENCE   |        |

Note:  
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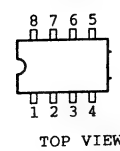
REF.NC

C001  
C008  
C010  
C011  
  
C012  
  
C014  
C017  
C019  
C020  
C023  
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C025  
C026  
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C046  
C047  
C048  
C050  
C051  
C052

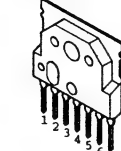


## 6-4. SEMICONDUCTORS

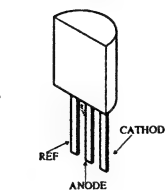
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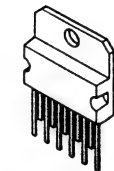
LA7830



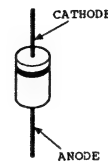
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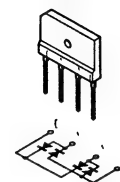
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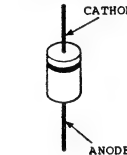
1SS119-25TD  
1SS133T-77  
MTZJ-T-77-10B  
MTZJ-T-77-2.2  
MTZJ-T-77-3.3B  
MTZJ-T-77-30D  
MTZJ-T-77-5.1C  
MTZJ-T-77-5.6C  
MTZJ-T-77-8.2B



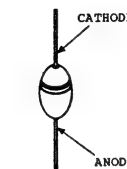
D3SB60F



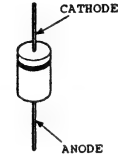
D1NL20-TA  
EL1Z-V1  
RGP10GPKG3



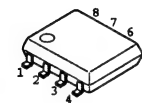
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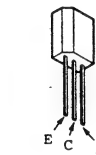
D2S4MTA1



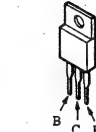
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NJM2234(TE2)  
NJM4558M-TE2



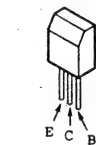
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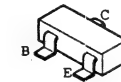
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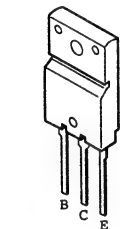
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2SD1292



2SA1330-T106  
2SB709A-QRS-TX  
2SD601A-QRS-TX



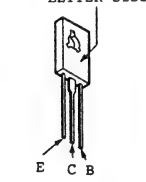
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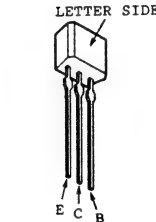
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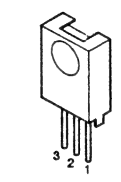
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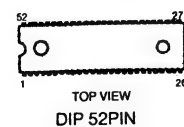
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SBX1790-51



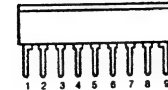
M37267M6 - 059SP



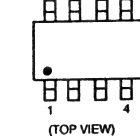
CXA1870S



uPC1406HA



ST24C01FM6TR



MM1319



## SECTION 7 EXPLODED VIEWS

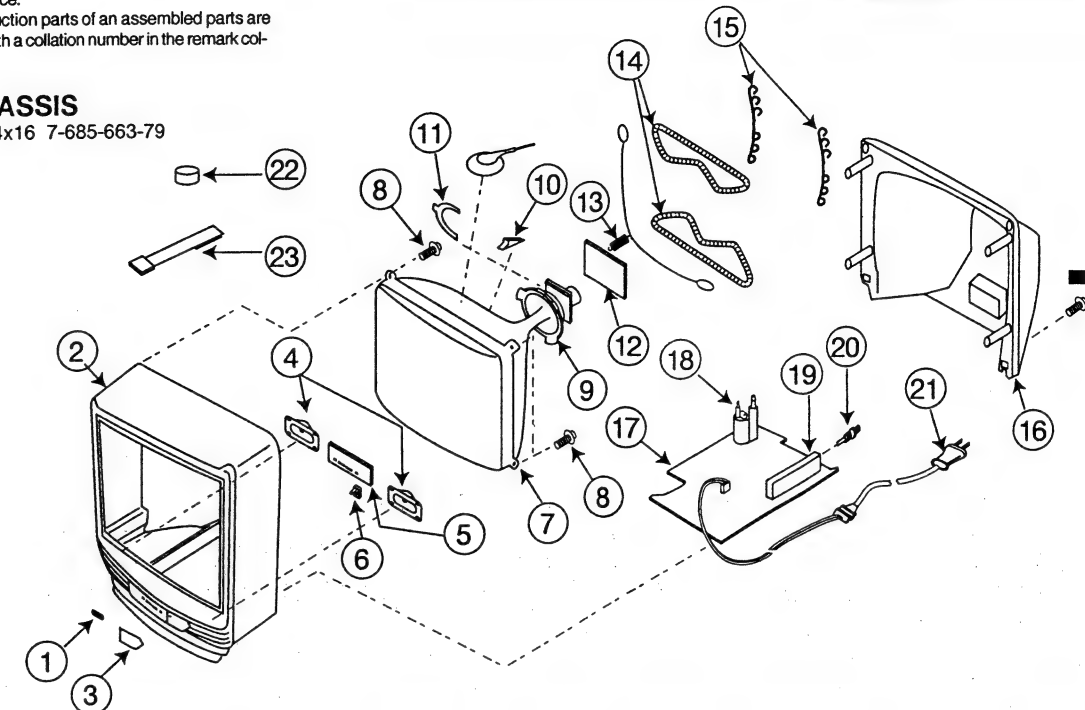
The components identified by shading and mark  $\Delta$  are critical for safety. Replace only with part number specified.

### NOTE:

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- The construction parts of an assembled parts are indicated with a collation number in the remark column.

### 7-1. CHASSIS

■ BVTP 4x16 7-685-663-79



| REF.NO. | PART NO.     | DESCRIPTION   | REMARK |
|---------|--------------|---|--------|
| 1       | 4-046-161-01 | EMBLEM (NO.8) SONY  |        |
| 2       | 4-052-638-01 | BEZEL (KV-20S30)  |        |
|         | 4-052-638-21 | BEZEL (KV-21R20)  |        |
|         | 4-052-638-41 | BEZEL (KV-21RS20)   |        |
|         | 4-052-653-01 | BEZEL (KV-20M20/21PM1)  |        |
|         | 4-052-653-11 | BEZEL (KV-21RD1)  |        |
|         | 4-052-656-11 | BEZEL (KV-20S20/21PS1)  |        |
|         | 4-052-656-31 | BEZEL (KV-20S21)  |        |
|         | 4-052-656-41 | BEZEL (KV-21SD1)  |        |
| 3       | 4-052-641-01 | DOOR, CONTROL (KV-21R20/20S20/21RS20/21PS1/20S30)                       |        |
|         | 4-052-641-21 | DOOR, CONTROL (KV-20M20/21PM1)  |        |
|         | 4-052-641-41 | DOOR, CONTROL (KV-20S21)  |        |
|         | 4-052-641-51 | DOOR, CONTROL (KV-21RD1)  |        |
|         | 4-052-641-61 | DOOR, CONTROL (KV-21SD1)  |        |
| 4       | 1-505-265-11 | SPEAKER (9X5CM) (KV-20M20/21RD1/21PM1/21R20)                            |        |
|         | 1-505-266-11 | SPEAKER (9X5CM) (KV-20S30/20S20/20S21/21SD1/21PS1/21RS20)               |        |
| 5       | 4-052-639-01 | BUTTON, MULTI   |        |
|         | 4-052-639-11 | BUTTON, MULTI (KV-20S21 ONLY)   |        |
| 6       | 4-052-640-01 | FILTER, REMOTE  |        |
| 7       | 8-738-768-05 | CRT 21IN (KV-20M20/21R20/21RD1/21PM1/20S30/20S20(05)/20S21/21SD1/21PS1) |        |
|         | 8-738-781-05 | CRT 21IN (KV-20S20(CMD)/21RS20)   |        |
| 8       | 4-365-808-01 | SCREW (5), TAPPING  |        |
| 9       | 8-451-440-11 | DT Y21NKA   |        |
| 10      | 4-053-005-01 | SPACER, DY  |        |
| 11      | 1-452-277-00 | MAGNET, BMC   |        |

| REF.NO. | PART NO.       | DESCRIPTION   | REMARK |
|---------|----------------|---|--------|
| 12      | * A-1331-518-A | MOUNTED PCB, C  |        |
| 13      | 4-375-394-01   | SPRING, GROUND  |        |
| 14      | 1-409-707-31   | COIL, DEMAGNETIZATION   |        |
| 15      | 4-369-319-11   | HOLDER, DEGAUSSING COIL   |        |
| 16      | 4-052-642-31   | REAR COVER (KV-20S21)   |        |
|         | 4-052-643-11   | REAR COVER (KV-20S30)   |        |
|         | 4-052-643-31   | REAR COVER (KV-21R20/20M20/21PM1/21RD1)   |        |
|         | 4-052-643-41   | REAR COVER (KV-21RS20/20S20/21PS1/21SD1)  |        |
| 17      | * A-1297-711-A | COMPLETE (PCB,A) (KV-20M20/21R20/21RD1/21PM1)   |        |
|         | * A-1297-712-A | COMPLETE (PCB,A) (KV-20S30)   |        |
|         | * A-1297-782-A | COMPLETE (PCB,A) (KV-20S20/20S21/21RS20/21SD1/21PS1)  |        |
| 18      | 1-453-211-11   | TRANSFORMER ASSY, FLYBACK(NX1744)   |        |
| 19      | 8-598-339-00   | TUNER BTP-LA402 (KV-20M20/21RD1/21PM1/21R20)  |        |
|         | 8-598-341-00   | TUNER BTP-WA405 (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)   |        |
| 20      | 1-766-374-11   | PLUG, F PIN   |        |
| 21      | 1-751-057-11   | CORD, POWER (WITH CONNECTOR) 10A/125V (KV-20M20/21R20/21RD1/21PM1/20S20/21RS20/21SD1/21PS1/20S30) |        |
|         | 1-751-058-11   | CORD, POWER (WITH CONNECTOR) 10A/125V (KV-20S21)  |        |
| 22      | 1-452-032-00   | MAGNET, DISC  |        |
| 23      | X-4308-815-0   | PERMALLOY ASSY, CONVERGENCE   |        |

25TD  
-77  
77-10B  
77-2.2  
77-3.3B  
77-30D  
77-5.1C  
77-5.6C  
77-8.2B

THODE

RODE

T106  
-QRS-TX  
-QRS-TX

790-51

319

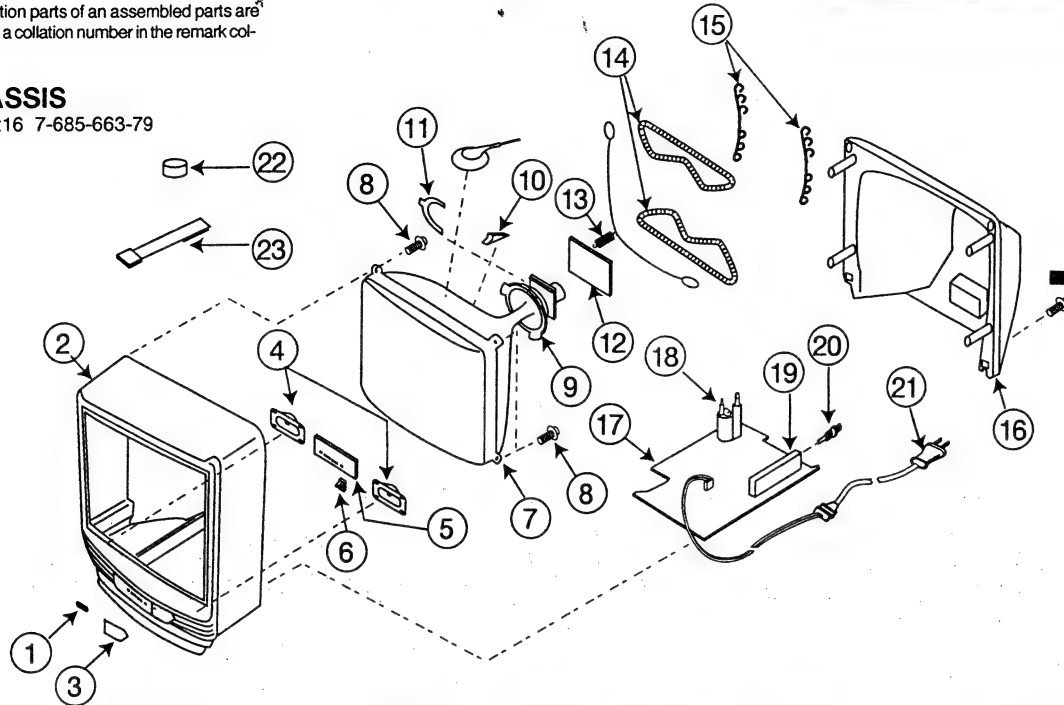
## SECTION 7 EXPLODED VIEWS

The components identified by shading and mark  $\Delta$  are critical for safety. Replace only with part number specified.

### NOTE:

- Items with no part number and no description are not stocked because they are seldom required for routine service.
- The construction parts of an assembled parts are indicated with a collation number in the remark column.

- Items marked " \* " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.



| REF.NO.    | PART NO.     | DESCRIPTION  | REMARK |
|------------|--------------|--|--------|
| 1          | 4-046-161-01 | EMBLEM (NO.8) SONY   |        |
| 2          | 4-052-638-01 | BEZEL (KV-20S30)   |        |
|            | 4-052-638-21 | BEZEL (KV-21R20)   |        |
|            | 4-052-638-41 | BEZEL (KV-21RS20)  |        |
|            | 4-052-653-01 | BEZEL (KV-20M20/21PM1)   |        |
|            | 4-052-653-11 | BEZEL (KV-21RD1)   |        |
|            | 4-052-656-11 | BEZEL (KV-20S20/21PS1)   |        |
|            | 4-052-656-31 | BEZEL (KV-20S21)   |        |
|            | 4-052-656-41 | BEZEL (KV-21SD1)   |        |
| 3          | 4-052-641-01 | DOOR, CONTROL (KV-21R20/20S20/21RS20/21PS1/20S30)                        |        |
|            | 4-052-641-21 | DOOR, CONTROL (KV-20M20/21PM1)   |        |
|            | 4-052-641-41 | DOOR, CONTROL (KV-20S21)   |        |
|            | 4-052-641-51 | DOOR, CONTROL (KV-21RD1)   |        |
|            | 4-052-641-61 | DOOR, CONTROL (KV-21SD1)   |        |
| 4          | 1-505-265-11 | SPEAKER (9X5CM) (KV-20M20/21RD1/21PM1/21R20)                             |        |
|            | 1-505-266-11 | SPEAKER (9X5CM) (KV-20S30/20S20/20S21/21SD1/21PS1/21RS20)                |        |
| 5          | 4-052-639-01 | BUTTON, MULTI  |        |
|            | 4-052-639-11 | BUTTON, MULTI (KV-20S21 ONLY)  |        |
| 6          | 4-052-640-01 | FILTER, REMOTE   |        |
| 7 $\Delta$ | 8-738-768-05 | CRT 21INX (KV-20M20/21R20/21RD1/21PM1/20S30/20S20(US)/20S21/21SD1/21PS1) |        |
| $\Delta$   | 8-738-781-05 | CRT 21INX (KV-20S20(CND)/21RS20)   |        |
| 8          | 4-365-808-01 | SCREW (5), TAPPING   |        |
| 9 $\Delta$ | 8-451-440-11 | DY Y21NKA  |        |
| 10         | 4-053-005-01 | SPACER, DY   |        |
| 11         | 1-452-277-00 | MAGNET, BMC  |        |

| REF.NO.     | PART NO.       | DESCRIPTION   | REMARK |
|-------------|----------------|---|--------|
| 12          | * A-1331-518-A | MOUNTED PCB, C  |        |
| 13          | 4-375-394-01   | SPRING, GROUND  |        |
| 14 $\Delta$ | 1-409-707-11   | COIL, DEMAGNETIZATION   |        |
| 15          | 4-369-319-11   | HOLDER, DEGAUSSING COIL   |        |
| 16          | 4-052-642-31   | REAR COVER (KV-20S21)   |        |
|             | 4-052-643-11   | REAR COVER (KV-20S30)   |        |
|             | 4-052-643-31   | REAR COVER (KV-21R20/20M20/21PM1/21RD1)   |        |
|             | 4-052-643-41   | REAR COVER (KV-21RS20/20S20/21PS1/21SD1)  |        |
| 17          | * A-1297-711-A | COMPLETE (PCB, A) (KV-20M20/21R20/21RD1/21PM1)  |        |
|             | * A-1297-712-A | COMPLETE (PCB, A) (KV-20S30)  |        |
|             | * A-1297-782-A | COMPLETE (PCB, A) (KV-20S20/20S21/21RS20/21SD1/21PS1)   |        |
| 18 $\Delta$ | 1-453-211-11   | TRANSFORMER ASSY, FLYBACK(NX1744)   |        |
| 19 $\Delta$ | 8-598-339-00   | TUNER BTP-1A402 (KV-20M20/21RD1/21PM1/21R20)  |        |
| $\Delta$    | 8-598-341-00   | TUNER BTP-WA405 (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)   |        |
| 20          | 1-766-374-11   | PLUG, P PIN   |        |
| 21 $\Delta$ | 1-751-057-11   | CORD, POWER (WITH CONNECTOR) 10A/125V (KV-20M20/21R20/21RD1/21PM1/20S30/21RS20/21SD1/21PS1/20S30) |        |
| $\Delta$    | 1-751-058-11   | CORD, POWER (WITH CONNECTOR) 10A/125V (KV-20S21)  |        |
| 22          | 1-452-032-00   | MAGNET, DISC  |        |
| 23          | X-4308-815-0   | PERMALLOY ASSY, CONVERGENCE   |        |

## SECTION 8 ELECTRICAL PARTS LIST

A

Note:

The components identified by shading and mark  $\Delta$  are critical for safety. Replace only with part number specified.

- Items marked " \* " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.

### RESISTORS

- All resistors are in ohms
- F : nonflammable

When indicating parts by reference number, please include the board name.

### CAPACITORS

MF :  $\mu$ F, PF :  $\mu$ F

### COILS

MMH : mH,  $\mu$ H :  $\mu$ H

- The components identified by  $\Delta$  in this manual have been carefully factory-selected for each set in order to satisfy regulations regarding X-ray radiation. Should replacement be required, replace only with the value originally used.

| REF.NO.        | PART NO.  | DESCRIPTION  | REMARK | REF.NO. | PART NO.     | DESCRIPTION  | REMARK |
|----------------|---|--|--------|---------|--------------|--|--------|
| * A-1297-711-A | A BOARD, COMPLETE (KV-20M20/21R20/21RD1/21PM1)        |  |        | C053    | 1-163-251-11 | CERAMIC CHIP 100pF 5% 50V  |        |
| * A-1297-712-A | A BOARD, COMPLETE (KV-20S30)                          |  |        | C060    | 1-163-227-11 | CERAMIC CHIP 10pF 0.5pF 50V  |        |
| * A-1297-782-A | A BOARD, COMPLETE (KV-20S20/20S21/21RS20/21SD1/21PS1) |  |        | C101    | 1-126-963-11 | ELECT 4.7MF 20% 50V  |        |
|                |   |  |        | C202    | 1-126-964-11 | ELECT 10MF 20% 50V   |        |
|                |   |  |        | C203    | 1-126-963-11 | ELECT 4.7MF 20% 50V (KV-20S30)   |        |
|                |   |  |        | C204    | 1-104-665-11 | ELECT 100MF 20% 25V  |        |
|                |   |  |        | C205    | 1-126-963-11 | ELECT 4.7MF 20% 50V  |        |
|                |   |  |        | C206    | 1-163-017-00 | CERAMIC CHIP 0.0047MF10% 50V   |        |
|                |   |  |        | C208    | 1-124-903-11 | ELECT 1MF 20% 50V (KV-20M20/21R20/21RD1/21PM1)                                   |        |
|                |   |  |        | C210    | 1-124-925-11 | ELECT 2.2MF 20% 50V (KV-20S30)   |        |
|                |   |  |        | C211    | 1-124-902-00 | ELECT 0.47MF 20% 50V (KV-20S30)  |        |
|                |   |  |        | C212    | 1-124-902-00 | ELECT 0.47MF 20% 50V (KV-20S30)  |        |
|                |   |  |        | C214    | 1-124-903-11 | ELECT 1MF 20% 50V (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)                      |        |
|                |   |  |        | C215    | 1-126-964-11 | ELECT 10MF 20% 50V   |        |
|                |   |  |        | C216    | 1-126-964-11 | ELECT 10MF 20% 50V (KV-20S30)  |        |
|                |   |  |        | C216    | 1-124-902-00 | ELECT 0.47MF 20% 50V (KV-20M20/21R20/21RD1/21PM1/20S20/20S21/21RS20/21SD1/21PS1) |        |
|                |   |  |        | C218    | 1-126-964-11 | ELECT 10MF 20% 50V (KV-20S30)  |        |
|                |   |  |        | C219    | 1-124-903-11 | ELECT 1MF 20% 50V (KV-20S30)   |        |
|                |   |  |        | C220    | 1-124-903-11 | ELECT 1MF 20% 50V (KV-20S30)   |        |
|                |   |  |        | C221    | 1-124-903-11 | ELECT 1MF 20% 50V (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)                      |        |
|                |   |  |        | C222    | 1-124-903-11 | ELECT 1MF 20% 50V  |        |
|                |   |  |        | C227    | 1-126-963-11 | ELECT 4.7MF 20% 50V (KV-20S30)   |        |
|                |   |  |        | C229    | 1-124-903-11 | ELECT 1MF 20% 50V  |        |
|                |   |  |        | C231    | 1-124-925-11 | ELECT 2.2MF 20% 50V (KV-20S30)   |        |
|                |   |  |        | C250    | 1-126-964-11 | ELECT 10MF 20% 50V (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)                     |        |
|                |   |  |        | C301    | 1-163-251-11 | CERAMIC CHIP 100pF 5% 50V  |        |
|                |   |  |        | C303    | 1-126-942-61 | ELECT 1000MF 20% 25V   |        |
|                |   |  |        | C315    | 1-104-664-11 | ELECT 47MF 20% 25V   |        |
|                |   |  |        | C330    | 1-163-007-11 | CERAMIC CHIP 680pF 10% 50V   |        |
|                |   |  |        | C352    | 1-163-229-11 | CERAMIC CHIP 12pF 5% 50V   |        |
|                |   |  |        | C353    | 1-163-005-11 | CERAMIC CHIP 470pF 10% 50V   |        |
|                |   |  |        | C354    | 1-124-902-00 | ELECT 0.47MF 20% 50V   |        |
|                |   |  |        | C355    | 1-164-232-11 | CERAMIC CHIP 0.01MF 10% 50V  |        |
|                |   |  |        | C356    | 1-126-934-11 | ELECT 220MF 20% 16V  |        |
|                |   |  |        | C357    | 1-124-464-11 | ELECT 0.22MF 20% 50V (KV-20S30)  |        |
|                |   |  |        | C358    | 1-124-902-00 | ELECT 0.47MF 20% 50V   |        |
| C001           | 1-163-125-00  | CERAMIC CHIP 220pF 5% 50V  |        |         |              |  |        |
| C008           | 1-163-009-11  | CERAMIC CHIP 0.001MF 10% 50V   |        |         |              |  |        |
| C010           | 1-163-009-11  | CERAMIC CHIP 0.001MF 10% 50V   |        |         |              |  |        |
| C011           | 1-163-009-11  | CERAMIC CHIP 0.001MF 10% 50V (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |        |         |              |  |        |
| C012           | 1-163-009-11  | CERAMIC CHIP 0.001MF 10% 50V (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |        |         |              |  |        |
| C014           | 1-164-004-11  | CERAMIC CHIP 0.1MF 10% 25V   |        |         |              |  |        |
| C017           | 1-124-903-11  | ELECT 1MF 20% 50V  |        |         |              |  |        |
| C019           | 1-163-135-00  | CERAMIC CHIP 560pF 5% 50V  |        |         |              |  |        |
| C020           | 1-137-399-11  | FILM 0.1MF 5% 50V  |        |         |              |  |        |
| C023           | 1-163-125-00  | CERAMIC CHIP 220pF 5% 50V  |        |         |              |  |        |
| C024           | 1-163-125-00  | CERAMIC CHIP 220pF 5% 50V  |        |         |              |  |        |
| C025           | 1-163-125-00  | CERAMIC CHIP 220pF 5% 50V  |        |         |              |  |        |
| C026           | 1-163-243-11  | CERAMIC CHIP 47pF 5% 50V   |        |         |              |  |        |
| C028           | 1-163-005-11  | CERAMIC CHIP 470pF 10% 50V   |        |         |              |  |        |
| C030           | 1-163-125-00  | CERAMIC CHIP 220pF 5% 50V  |        |         |              |  |        |
| C034           | 1-163-037-11  | CERAMIC CHIP 0.022MF 10% 50V   |        |         |              |  |        |
| C037           | 1-164-161-11  | CERAMIC CHIP 0.0022MF 10% 50V  |        |         |              |  |        |
| C038           | 1-126-941-11  | ELECT 470MF 20% 25V  |        |         |              |  |        |
| C046           | 1-104-664-11  | ELECT 47MF 20% 25V   |        |         |              |  |        |
| C047           | 1-163-125-00  | CERAMIC CHIP 220pF 5% 50V  |        |         |              |  |        |
| C048           | 1-163-009-11  | CERAMIC CHIP 0.001MF 10% 50V   |        |         |              |  |        |
| C050           | 1-163-251-11  | CERAMIC CHIP 100pF 5% 50V  |        |         |              |  |        |
| C051           | 1-163-251-11  | CERAMIC CHIP 100pF 5% 50V  |        |         |              |  |        |
| C052           | 1-163-251-11  | CERAMIC CHIP 100pF 5% 50V  |        |         |              |  |        |

The components identified by shading and mark **Δ** are critical for safety.  
Replace only with part number specified.

**A**

| REF.NO.   | PART.NO.     | DESCRIPTION   | REMARK | REF.NO. | PART.NO.     | DESCRIPTION   | REMARK |
|---|--------------|---|--------|---------|--------------|---|--------|
| C359  | 1-124-902-00 | ELECT 0.47MF 20% 50V  |        | C491    | 1-126-942-61 | ELECT 470MF 20% 25V<br>(KV-20M20/21R20/21RD1/21PM1) |        |
| C360  | 1-126-963-11 | ELECT 4.7MF 20% 50V   |        | C502    | 1-126-965-11 | ELECT 22MF 20% 50V                                  |        |
| C361  | 1-137-399-11 | FILM 0.1MF 5% 50V   |        | C503    | 1-107-698-11 | ELECT 10MF 20% 25V                                  |        |
| C362  | 1-137-399-11 | FILM 0.1MF 5% 50V   |        | C504    | 1-130-489-00 | FILM 0.033MF 5% 50V                                 |        |
| C363  | 1-137-399-11 | FILM 0.1MF 5% 50V   |        | C505    | 1-102-963-00 | CERAMIC 33pF 5% 50V                                 |        |
| C364  | 1-124-902-00 | ELECT 0.47MF 20% 50V  |        | C507    | 1-102-038-00 | CERAMIC 0.001MF 500V                                |        |
| C366  | 1-124-903-11 | ELECT 1MF 20% 50V   |        | C508    | 1-102-038-00 | CERAMIC 0.001MF 500V                                |        |
| C367  | 1-126-963-11 | ELECT 4.7MF 20% 50V   |        | C509    | 1-126-968-11 | ELECT 100MF 20% 50V                                 |        |
| C368  | 1-136-169-00 | FILM 0.22MF 5% 50V  |        | C510    | 1-108-702-11 | MYLAR 0.068MF 10% 100V                              |        |
| C369  | 1-164-004-11 | CERAMIC CHIP 0.22MF 10% 25V                                       |        | C511 Δ  | 1-126-963-11 | ELECT 4.7MF 20% 50V                                 |        |
| C373  | 1-137-370-11 | FILM 0.01MF 5% 50V  |        | C512    | 1-163-031-11 | CERAMIC CHIP 0.01MF 50V                             |        |
| C374  | 1-163-125-00 | CERAMIC CHIP 220pF 5% 50V   |        | C513    | 1-126-964-11 | ELECT 10MF 20% 50V                                  |        |
| C375  | 1-126-963-11 | ELECT 4.7MF 20% 50V   |        | C514    | 1-104-664-11 | ELECT 47MF 20% 25V                                  |        |
| C376  | 1-164-232-11 | CERAMIC CHIP 0.01MF 10% 50V                                       |        | C515    | 1-126-941-11 | ELECT 470MF 20% 25V                                 |        |
| C378  | 1-124-925-11 | ELECT 2.2MF 20% 50V   |        | C516    | 1-102-244-00 | CERAMIC 220pF 10% 500V                              |        |
| C379  | 1-164-232-11 | CERAMIC CHIP 0.01MF 10% 50V                                       |        | C517    | 1-126-941-11 | ELECT 470MF 20% 25V                                 |        |
| C381  | 1-124-903-11 | ELECT 1MF 20% 50V   |        | C518    | 1-126-941-11 | ELECT 470MF 20% 25V                                 |        |
| C382  | 1-104-665-11 | ELECT 100MF 20% 25V   |        | C519    | 1-102-244-00 | CERAMIC 220pF 10% 500V                              |        |
| C383  | 1-163-017-00 | CERAMIC CHIP 0.0047MF 10% 50V                                     |        | C520    | 1-107-652-11 | ELECT 10MF 20% 250V                                 |        |
| C390  | 1-137-399-11 | FILM 0.1MF 5% 50V   |        | C521    | 1-102-244-00 | CERAMIC 220pF 10% 500V                              |        |
| C408  | 1-126-964-11 | ELECT 0.47MF 20% 50V<br>(KV-20M20//21R20/21RD1/21PM1)             |        | C522    | 1-123-024-21 | ELECT 33MF 160V                                     |        |
| C408  | 1-126-964-11 | ELECT 10MF 20% 50V<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)   |        | C523    | 1-136-105-00 | FILM 0.33MF 5% 200V                                 |        |
| < C410 - C435 LOCATED ON ><br><KV-20S20/20S21/21RS20/21SD1/21PS1/20S30> |              |   |        | C525    | 1-106-387-00 | MYLAR 0.068MF 10% 200V                              |        |
| C410  | 1-126-964-11 | ELECT 10MF 20% 50V  |        | C527    | 1-126-965-11 | ELECT 22MF 20% 50V                                  |        |
| C412  | 1-126-964-11 | ELECT 10MF 20% 50V  |        | C528 Δ  | 1-107-635-11 | ELECT 4.7MF 20% 160V                                |        |
| C413  | 1-126-964-11 | ELECT 10MF 20% 50V  |        | C530    | 1-104-664-11 | ELECT 47MF 20% 25V                                  |        |
| C435  | 1-124-925-11 | ELECT 2.2MF 20% 50V   |        | C553    | 1-102-228-00 | CERAMIC 470pF 10% 500V                              |        |
| C436  | 1-126-956-91 | ELECT 0.1MF 20% 50V<br>(KV-20M20/21R20/21RD1/21PM1)               |        | C554 Δ  | 1-109-881-11 | FILM 0.0057MF 3% 2.0KV                              |        |
| C437  | 1-124-925-11 | ELECT 2.2MF 20% 50V<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)  |        | C555 Δ  | 1-162-115-00 | CERAMIC 330pF 10% 2KV                               |        |
| C438  | 1-126-933-11 | ELECT 100MF 20% 16V<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)  |        | C558    | 1-106-371-00 | MYLAR 0.015MF 10% 100V                              |        |
| C439  | 1-126-965-11 | ELECT 22MF 20% 50V  |        | C559 Δ  | 1-162-115-00 | CERAMIC 330pF 10% 2KV                               |        |
| < C440 - C443 LOCATED ON ><br><KV-20S20/20S21/21RS20/21SD1/21PS1/20S30> |              |   |        | C575    | 1-106-371-00 | MYLAR 0.015MF 200V                                  |        |
| C440  | 1-126-933-11 | ELECT 100MF 20% 16V   |        | C579    | 1-106-367-00 | MYLAR 0.01MF 10% 200V                               |        |
| C441  | 1-124-925-11 | ELECT 2.2MF 20% 50V   |        | C601 Δ  | 1-113-920-11 | ELECT 0.0022MF 20% 250V                             |        |
| C442  | 1-136-169-00 | FILM 0.22MF 5% 50V  |        | C605 Δ  | 1-113-920-11 | ELECT 0.0022MF 20% 250V                             |        |
| C443  | 1-126-941-11 | ELECT 470MF 20% 25V   |        | C609    | 1-104-759-11 | ELECT 470MF 20% 200V                                |        |
| C444  | 1-126-941-11 | ELECT 470MF 20% 25V   |        | C610    | 1-164-625-11 | CERAMIC 680pF 10% 500V                              |        |
| C447  | 1-136-169-00 | FILM 0.22MF 5% 50V<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)   |        | C611    | 1-164-625-11 | CERAMIC 680pF 10% 500V                              |        |
| C448  | 1-136-173-00 | FILM 0.47MF 5% 50V  |        | C612    | 1-136-171-00 | FILM 0.33MF 5% 50V                                  |        |
| C490  | 1-126-941-11 | ELECT 470MF 20% 25V   |        | C613    | 1-136-171-00 | FILM 0.33MF 5% 50V                                  |        |
| C491  | 1-126-942-61 | ELECT 1000MF 20% 25V<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |        | C614    | 1-136-759-11 | FILM 0.039MF 5% 630V                                |        |
|   |              |   |        | C615    | 1-164-735-11 | CAPACITOR 0.0015MF 10% 500V                         |        |
|   |              |   |        | C617    | 1-137-367-11 | FILM 0.0033MF 5% 50V                                |        |
|   |              |   |        | C619    | 1-106-355-12 | MYLAR 0.0033MF 10% 200V                             |        |
|   |              |   |        | C622    | 1-126-942-61 | ELECT 1000MF 20% 25V                                |        |
|   |              |   |        | C623    | 1-123-024-21 | ELECT 33MF 160V                                     |        |
|   |              |   |        | C625    | 1-104-665-11 | ELECT 100MF 20% 25V                                 |        |
|   |              |   |        | C628    | 1-104-664-11 | ELECT 47MF 20% 25V                                  |        |
|   |              |   |        | C631    | 1-104-664-11 | ELECT 47MF 20% 25V                                  |        |
|   |              |   |        | C632    | 1-124-902-00 | ELECT 0.47MF 20% 50V                                |        |
|   |              |   |        | C633    | 1-124-925-11 | ELECT 2.2MF 20% 50V                                 |        |
|   |              |   |        | C636 Δ  | 1-113-920-11 | ELECT 0.0022MF 20% 250V                             |        |
|   |              |   |        | C638 Δ  | 1-113-920-11 | ELECT 0.0022MF 20% 250V                             |        |

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The components identified by shading and mark  $\Delta$  are critical for safety .  
Replace only with part number specified.

REF.NO. PART NO. DESCRIPTION REMARK

C640  $\Delta$  1-136-311-11 FILM 0.47MF 20% 125V  
C641 1-136-167-00 FILM 0.15MF 5% 50V  
C642 1-136-167-00 FILM 0.15MF 5% 50V  
C643 1-165-127-11 CERAMIC 470pF 10% 500V  
C644 1-165-127-11 CERAMIC 470pF 10% 500V

C645 1-165-127-11 CERAMIC 470pF 10% 500V  
C646 1-165-127-11 CERAMIC 470pF 10% 500V  
C653 1-113-910-11 ELECT 470pF 10% 250V  
C685 1-124-903-11 ELECT 1MF 20% 50V  
C690 1-124-902-00 ELECT 0.47MF 20% 50V

C691 1-126-941-11 ELECT 470MF 20% 25V  
C692 1-104-664-11 ELECT 47MF 20% 25V  
C693 1-136-173-00 FILM 0.47MF 5% 50V

<FILTER>

CF001 1-579-952-21 VIBRATOR, CERAMIC

<CONNECTOR>

CN203 \* 1-560-124-00 PLUG, CONNECTOR (2.5MM) 4P  
CN301 1-900-800-67 CONNECTOR ASSY, 6P MINI MICRO  
CN401 1-564-505-11 PLUG, CONNECTOR 2P  
(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)

CN402 1-564-505-11 PLUG, CONNECTOR 2P  
CN501 \* 1-580-798-11 CONNECTOR PIN (DY) 6P  
CN503 1-900-800-66 CONNECTOR ASSY, 4P MINI MICRO  
CN601 \* 1-580-843-11 PIN, CONNECTOR (POWER)  
CN602 1-508-786-00 PIN, CONNECTOR (5MM PITCH) 2P

<DIODE>

D001 8-719-921-44 DIODE MTZJ-T-77-5.1C  
D201 8-719-982-22 DIODE MTZJ-T-77-30D  
D203 8-719-109-66 DIODE MTZJ-T-77-3.3B (KV-20S30)  
D205 8-719-110-17 DIODE MTZJ-T-77-10B  
D206 8-719-110-17 DIODE MTZJ-T-77-10B  
(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)

D207 8-719-110-17 DIODE MTZJ-T-77-10B  
D225 8-719-110-17 DIODE MTZJ-T-77-10B (KV-20S30)  
D226 8-719-110-17 DIODE MTZJ-T-77-10B (KV-20S30)  
D227 8-719-110-17 DIODE MTZJ-T-77-10B (KV-20S30)

D310 8-719-921-44 DIODE MTZJ-T-77-5.1C  
D403 8-719-991-33 DIODE 1SS133T-77  
D415 8-719-982-96 DIODE MTZJ-T-77-2.2A  
(KV-20M20/21R20/21RD1/21PM1)

D502 8-719-908-03 DIODE GP08DPKG3  
D503 8-719-991-33 DIODE 1SS133T-77  
D504 8-719-302-43 DIODE RGP10GPKG3  
D505 8-719-991-33 DIODE 1SS133T-77  
D506 8-719-110-08 DIODE MTZJ-T-77-8.2B

D507 8-719-991-33 DIODE 1SS133T-77  
D509 8-719-302-43 DIODE RGP10GPKG3  
D510  $\Delta$  8-719-302-43 DIODE EL1Z-V1  
D512 8-719-302-43 DIODE RGP10GPKG3

REF.NO. PART NO. DESCRIPTION REMARK

D514 8-719-991-33 DIODE 1SS133T-77  
D515 8-719-302-43 DIODE RGP10GPKG3  
D601  $\Delta$  8-719-510-51 DIODE DSB60P  
D602 8-719-991-33 DIODE 1SS133T-77  
D603 8-719-911-19 DIODE 1SS119-25TD

D604 8-719-911-19 DIODE 1SS119-25TD  
D605 8-719-022-97 DIODE D2S4MTA1  
D606 8-719-022-97 DIODE D2S4MTA1  
D607 8-719-510-26 DIODE D1NL20-TA  
D608 8-719-510-26 DIODE D1NL20-TA

D609 8-719-510-26 DIODE D1NL20-TA  
D610 8-719-510-26 DIODE D1NL20-TA  
D611 8-719-110-17 DIODE MTZJ-T-77-10B  
D612 8-719-109-89 DIODE MTZJ-T-77-5.6C  
D613 8-719-057-53 DIODE EZ0150V1

D614 8-719-911-19 DIODE 1SS119-25TD  
D615 8-719-911-19 DIODE 1SS119-25TD  
D619 8-719-911-19 DIODE 1SS119-25TD

<FUSE>

F601  $\Delta$  1-576-193-11 FUSE 6 3A/125V

<FERRITE BEAD>

FB501 1-410-396-41 FERRITE BEAD INDUCTOR 0.45UH  
FB601 1-412-911-11 INDUCTOR, FERRITE BEAD  
FB602 1-412-911-11 INDUCTOR, FERRITE BEAD  
FB605 1-410-396-41 FERRITE BEAD INDUCTOR 0.45UH  
FB606 1-410-396-41 FERRITE BEAD INDUCTOR 0.45UH  
FB607 1-410-396-41 FERRITE BEAD INDUCTOR 0.45UH  
FB611 1-412-911-11 INDUCTOR, FERRITE BEAD

<IC>

IC001 8-759-390-31 IC M37267M6-059SP  
IC003 8-759-354-27 IC ST24C01FM6TR  
IC103 8-747-905-11 IC SBX1790-51  
IC201 8-759-100-96 IC NJM4558M-TE2 (KV-20S30)  
IC215 8-759-710-07 IC NJM2234M-TE2 (KV-20S30)  
IC215 8-759-710-86 IC NJM2233BM-TE2  
(KV-20S20/20S21/21RS20/21SD1/21PS1)  
IC216 8-759-710-07 IC NJM2234M-TE2 (KV-20S30)  
IC216 8-759-710-86 IC NJM2233BM-TE2  
(KV-20M20/21R20/21RD1/21PM1/20S20/20S21/  
21RS20/21SD1/21PS1)  
IC217 8-759-710-07 IC NJM2234M-TE2 (KV-20S30)  
IC301 8-752-070-52 IC CXA1870S  
IC402 8-759-365-39 IC TDA7267  
(KV-20M20/21R20/21RD1/21PM1)  
IC406 8-759-145-27 IC UPC1406HA  
(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)  
IC408 8-759-980-43 IC TDA2009A  
(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)



The components identified by shading and mark **Δ** are critical for safety .  
Replace only with part number specified.



| REF.NO.          | PART.NO.     | DESCRIPTION                          | REMARK                                    | REF.NO.    | PART.NO.     | DESCRIPTION               | REMARK                                    |
|------------------|--------------|--------------------------------------|---|------------|--------------|---------------------------|---|
| IC501            | 8-759-801-98 | IC LA7830                            |   | Q613       | 8-729-422-27 | TRANSISTOR 2SD601A-QRS-TX |   |
| IC502 <b>Δ</b>   | 8-759-100-96 | IC NJM4558M-TE2                      |   | Q614       | 8-729-422-27 | TRANSISTOR 2SD601A-QRS-TX |   |
| IC601 <b>Δ</b>   | 8-759-198-31 | IC UPC1093J-1-T                      |   | Q615       | 8-729-422-27 | TRANSISTOR 2SD601A-QRS-TX |   |
| IC693            | 8-759-371-21 | IC MM1319                            |   |            |              |                           |   |
| <JACK>           |              |                                      |   | <RESISTOR> |              |                           |   |
| J200             | 1-580-441-11 | JACK, PIN 2P                         | (KV-20S30)                                | R001       | 1-216-065-00 | METAL GLAZE 4.7K 5% 1/10W |   |
| J201             | 1-580-443-11 | JACK, PIN 3P                         | (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) | R002       | 1-216-073-00 | METAL GLAZE 10K 5% 1/10W  |   |
|                  |              |                                      |   | R003       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  |   |
| J201             | 1-580-411-31 | JACK, PIN 2P                         | (KV-20M20/21R20/21RD1/21PM1)              | R005       | 1-249-429-11 | CARBON 10K 5% 1/4W        |   |
|                  |              |                                      |   | R007       | 1-249-421-11 | CARBON 2.2K 5% 1/4W       |   |
| J202             | 1-691-110-11 | JACK, PIN 3P                         | (KV-20S30)                                | R008       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  |   |
| J400             | 1-568-267-21 | JACK                                 |   | R009       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  |   |
|                  |              |                                      |   | R010       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  | (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |
| <CHIP CONDUCTOR> |              |                                      |   | R011       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  | (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |
| JR002            | 1-216-295-91 | CONDUCTOR, CHIP                      | (2012)                                    |            |              |                           |   |
| JR007            | 1-216-295-91 | CONDUCTOR, CHIP                      | (2012)                                    | R012       | 1-247-815-91 | CARBON 220 5% 1/4W        |   |
| JR290            | 1-216-295-91 | CONDUCTOR, CHIP                      | (2012)                                    | R013       | 1-216-081-00 | METAL GLAZE 22K 5% 1/10W  |   |
|                  |              |                                      |   | R014       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  |   |
| <COIL>           |              |                                      |   | R015       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  |   |
| L001             | 1-410-470-11 | INDUCTOR 100H                        |   | R016       | 1-216-041-00 | METAL GLAZE 470 5% 1/10W  |   |
| L002             | 1-408-421-00 | INDUCTOR 1000H                       |   |            |              |                           |   |
| L003             | 1-408-421-00 | INDUCTOR 1000H                       |   | R017       | 1-216-113-00 | METAL GLAZE 470K 5% 1/10W |   |
| L202             | 1-410-470-11 | INDUCTOR 100H                        |   | R018       | 1-216-049-91 | METAL GLAZE 1K 5% 1/10W   |   |
| L316             | 1-410-671-31 | INDUCTOR 47UH                        |   | R019       | 1-249-425-11 | CARBON 4.7K 5% 1/4W       |   |
| L501             | 1-412-553-11 | INDUCTOR 3.3MMH                      |   | R020       | 1-216-069-00 | METAL GLAZE 6.8K 5% 1/10W |   |
| L502             | 1-410-669-31 | INDUCTOR 33UH                        |   | R021       | 1-216-045-00 | METAL GLAZE 680 5% 1/10W  |   |
| L503 <b>Δ</b>    | 1-412-531-31 | INDUCTOR 33UH                        |   |            |              |                           |   |
| L551             | 1-412-533-21 | INDUCTOR 47UH                        |   | R022       | 1-216-047-91 | METAL GLAZE 820 5% 1/10W  |   |
|                  |              |                                      |   | R023       | 1-216-057-00 | METAL GLAZE 2.2K 5% 1/10W |   |
| <IC LINK>        |              |                                      |   | R025       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  |   |
| PS401 <b>Δ</b>   | 1-532-637-00 | LINK, IC                             | (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) | R026       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  |   |
|                  |              |                                      |   | R027       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  |   |
| <TRANSISTOR>     |              |                                      |   |            |              |                           |   |
| Q205             | 8-729-422-27 | TRANSISTOR 2SD601A-QRS-TX            |   | R028       | 1-216-041-00 | METAL GLAZE 470 5% 1/10W  |   |
| Q210             | 8-729-422-27 | TRANSISTOR 2SD601A-QRS-TX (KV-20S30) |   | R029       | 1-249-431-11 | CARBON 15K 5% 1/4W        |   |
| Q211             | 8-729-422-27 | TRANSISTOR 2SD601A-QRS-TX (KV-20S30) |   | R030       | 1-249-429-11 | CARBON 10K 5% 1/4W        |   |
| Q301             | 8-729-216-22 | TRANSISTOR 2SB709A-QRS-TX            |   | R031       | 1-216-045-00 | METAL GLAZE 680 5% 1/10W  |   |
| Q305             | 8-729-216-22 | TRANSISTOR 2SB709A-QRS-TX            |   | R032       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  |   |
|                  |              |                                      |   |            |              |                           |   |
| Q405             | 8-729-216-22 | TRANSISTOR 2SB709A-QRS-TX            | (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) | R033       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  |   |
|                  |              |                                      |   | R038       | 1-216-049-91 | METAL GLAZE 1K 5% 1/10W   |   |
| Q406             | 8-729-422-27 | TRANSISTOR 2SD601A-QRS-TX            | (KV-20M20/21R20/21RD1/21PM1)              | R039       | 1-216-077-00 | METAL GLAZE 15K 5% 1/10W  |   |
|                  |              |                                      |   | R041       | 1-216-295-91 | CONDUCTOR, CHIP (2012)    | (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |
| Q504             | 8-729-105-08 | TRANSISTOR 2SA1330-T106              |   |            |              |                           |   |
| Q550             | 8-729-140-96 | TRANSISTOR 2SC3209LK-TP              |   | R042       | 1-249-425-11 | CARBON 4.7K 5% 1/4W       | (KV-20M20/21R20/21RD1/21PM1)              |
| Q551             | 8-729-810-49 | TRANSISTOR 2SD1877S-SONY-CA          |   |            |              |                           |   |
| Q601             | 8-729-422-27 | TRANSISTOR 2SD601A-QRS-TX            |   | R043       | 1-249-417-11 | CARBON 1K 5% 1/4W         |   |
| Q602             | 8-729-035-37 | TRANSISTOR 2SC5271-ROYG-F            |   | R044       | 1-247-815-91 | CARBON 220 5% 1/4W        |   |
|                  |              |                                      |   | R045       | 1-216-065-00 | METAL GLAZE 4.7K 5% 1/10W |   |
| Q603             | 8-729-035-37 | TRANSISTOR 2SC5271-ROYG-F            |   | R046       | 1-247-815-91 | CARBON 220 5% 1/4W        |   |
| Q605             | 8-729-422-27 | TRANSISTOR 2SD601A-QRS-TX            |   | R047       | 1-216-065-00 | METAL GLAZE 4.7K 5% 1/10W |   |
| Q606             | 8-729-423-99 | TRANSISTOR 2SD2137-OP-TA             |   |            |              |                           |   |
| Q607             | 8-729-111-55 | TRANSISTOR 2SD1292                   |   | R048       | 1-216-025-91 | METAL GLAZE 100 5% 1/10W  |   |
| Q610             | 8-729-216-22 | TRANSISTOR 2SB709A-QRS-TX            |   | R049       | 1-216-089-91 | METAL GLAZE 47K 5% 1/10W  |   |
| Q612             | 8-729-422-27 | TRANSISTOR 2SD601A-QRS-TX            |   | R050       | 1-216-073-00 | METAL GLAZE 10K 5% 1/10W  |   |
|                  |              |                                      |   | R051       | 1-216-033-00 | METAL GLAZE 220 5% 1/10W  | (KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |

**A**

The components identified by shading and mark **Δ** are critical for safety .  
Replace only with part number specified.

| REF.NO.  | PART NO.     | DESCRIPTION         | REMARK   |
|--|--------------|---------------------|--|
| R054   | 1-216-073-00 | METAL GLAZE 10K 5%  | 1/10W  |
| R055   | 1-216-033-00 | METAL GLAZE 220 5%  | 1/10W  |
| R056   | 1-216-065-00 | METAL GLAZE 4.7K 5% | 1/10W  |
| R057   | 1-216-065-00 | METAL GLAZE 4.7K 5% | 1/10W  |
| R058   | 1-216-065-00 | METAL GLAZE 4.7K 5% | 1/10W  |
| R070   | 1-249-425-11 | CARBON 4.7K 5%      | 1/4W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)  |
| R071   | 1-249-425-11 | CARBON 4.7K 5%      | 1/4W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)  |
| R072   | 1-216-033-00 | METAL GLAZE 220 5%  | 1/10W (KV-20S30)                                   |
| R101   | 1-249-429-11 | CARBON 10K 5%       | 1/4W   |
| R200   | 1-216-069-00 | METAL GLAZE 6.8K 5% | 1/10W (KV-20S30)                                   |
| R203   | 1-215-899-11 | METAL OXIDE 15K 5%  | 2W F   |
| R204   | 1-216-097-91 | METAL GLAZE 100K 5% | 1/10W (KV-20S30)                                   |
| R206   | 1-216-689-11 | METAL GLAZE 39K 5%  | 1/10W  |
| R207   | 1-216-083-00 | METAL GLAZE 27K 5%  | 1/10W  |
| < R208 - R211 LOCATED ON ><br><(KV-20M20/21R20/21RD1/21PM1)> |              |                     |  |
| R208   | 1-216-065-00 | METAL GLAZE 4.7K 5% | 1/10W  |
| R209   | 1-216-069-00 | METAL GLAZE 6.8K 5% | 1/10W  |
| R210   | 1-216-033-00 | METAL GLAZE 220 5%  | 1/10W  |
| R211   | 1-216-049-91 | METAL GLAZE 1K 5%   | 1/10W  |
| R212   | 1-249-425-11 | CARBON 4.7K 5%      | 1/4W   |
| R213   | 1-216-113-00 | METAL GLAZE 470K 5% | 1/10W (KV-20S30)                                   |
| R214   | 1-216-097-91 | METAL GLAZE 100K 5% | 1/10W (KV-20S30)                                   |
| R216   | 1-216-069-00 | METAL GLAZE 6.8K 5% | 1/10W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |
| R217   | 1-216-065-00 | METAL GLAZE 4.7K 5% | 1/10W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |
| < R218 - R222 LOCATED ON KV-20S30>                           |              |                     |  |
| R218   | 1-216-089-91 | METAL GLAZE 47K 5%  | 1/10W  |
| R219   | 1-216-049-91 | METAL GLAZE 1K 5%   | 1/10W  |
| R220   | 1-216-089-91 | METAL GLAZE 47K 5%  | 1/10W  |
| R222   | 1-216-073-00 | METAL GLAZE 10K 5%  | 1/10W  |
| R223   | 1-247-807-31 | CARBON 100 5%       | 1/4W   |
| < R224 - R226 LOCATED ON KV-20S30>                           |              |                     |  |
| R224   | 1-216-049-91 | METAL GLAZE 1K 5%   | 1/10W  |
| R225   | 1-216-295-91 | CONDUCTOR, CHIP     | (2012)   |
| R226   | 1-216-295-91 | CONDUCTOR, CHIP     | (2012)   |
| R231   | 1-216-113-00 | METAL GLAZE 470K 5% | 1/10W  |
| R232   | 1-216-022-00 | METAL GLAZE 75 5%   | 1/10W  |
| R233   | 1-216-113-00 | METAL GLAZE 470K 5% | 1/10W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |
| < R243 - R274 LOCATED ON KV-20S30>                           |              |                     |  |
| R243   | 1-216-295-91 | CONDUCTOR, CHIP     | (2012)   |
| R247   | 1-216-097-91 | METAL GLAZE 100K 5% | 1/10W  |
| R248   | 1-216-097-91 | METAL GLAZE 100K 5% | 1/10W  |
| R263   | 1-216-022-00 | METAL GLAZE 75 5%   | 1/10W  |
| R264   | 1-216-113-00 | METAL GLAZE 470K 5% | 1/10W  |
| R265   | 1-216-113-00 | METAL GLAZE 470K 5% | 1/10W  |

| REF.NO. | PART NO.     | DESCRIPTION         | REMARK  |
|---------|--------------|---------------------|---|
| R270    | 1-216-113-00 | METAL GLAZE 470K 5% | 1/10W   |
| R271    | 1-216-061-00 | METAL GLAZE 3.3K 5% | 1/10W   |
| R272    | 1-216-061-00 | METAL GLAZE 3.3K 5% | 1/10W   |
| R273    | 1-216-097-91 | METAL GLAZE 100K 5% | 1/10W   |
| R274    | 1-216-097-91 | METAL GLAZE 100K 5% | 1/10W   |
| R284    | 1-216-041-00 | METAL GLAZE 470 5%  | 1/10W   |
| R285    | 1-216-041-00 | METAL GLAZE 470 5%  | 1/10W   |
| R288    | 1-216-069-00 | METAL GLAZE 6.8K 5% | 1/10W (KV-20S30)  |
| R290    | 1-247-807-31 | RES, CARBON 100 5%  | 1/4W (KV-20S30)   |
| R291    | 1-216-295-91 | CONDUCTOR, CHIP     | (2012)  |
| R292    | 1-216-295-91 | CONDUCTOR, CHIP     | (2012)<br>(KV-20M20/21R20/21RD1/21PM1/20S20/20S21/21RS20/21SD1/21PS1) |
| R293    | 1-216-025-91 | RES, CHIP 100 5%    | 1/10W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)                    |
| R297    | 1-216-295-91 | CONDUCTOR, CHIP     | (2012)<br>(KV-20M20/21R20/21RD1/21PM1)                                |
| R301    | 1-249-423-11 | CARBON 3.3K 5%      | 1/4W  |
| R302    | 1-216-057-00 | METAL GLAZE 2.2K 5% | 1/10W   |
| R306    | 1-249-417-11 | CARBON 1K 5%        | 1/4W  |
| R307    | 1-216-295-91 | CONDUCTOR, CHIP     | (2012)  |
| R310    | 1-216-065-00 | METAL GLAZE 4.7K 5% | 1/10W   |
| R312    | 1-216-295-91 | CONDUCTOR, CHIP     | (2012)  |
| R335    | 1-247-815-91 | CARBON 220 5%       | 1/4W  |
| R336    | 1-247-815-91 | CARBON 220 5%       | 1/4W  |
| R339    | 1-216-057-00 | METAL GLAZE 2.2K 5% | 1/10W   |
| R340    | 1-216-077-00 | METAL GLAZE 15K 5%  | 1/10W   |
| R341    | 1-216-113-00 | METAL GLAZE 470K 5% | 1/10W   |
| R342    | 1-216-033-00 | METAL GLAZE 220 5%  | 1/10W   |
| R343    | 1-247-815-91 | CARBON 220 5%       | 1/4W  |
| R344    | 1-247-815-91 | CARBON 220 5%       | 1/4W  |
| R345    | 1-247-815-91 | CARBON 220 5%       | 1/4W  |
| R346    | 1-247-815-91 | CARBON 220 5%       | 1/4W  |
| R347    | 1-216-045-00 | METAL GLAZE 680 5%  | 1/10W   |
| R348    | 1-247-815-91 | CARBON 220 5%       | 1/4W  |
| R349    | 1-247-807-31 | CARBON 100 5%       | 1/4W  |
| R351    | 1-249-429-11 | CARBON 10K 5%       | 1/4W  |
| R353    | 1-249-417-11 | CARBON 1K 5%        | 1/4W  |
| R355    | 1-249-419-00 | METAL GLAZE 15K 5%  | 1/10W   |
| R356    | 1-249-421-11 | CARBON 2.2K 5%      | 1/4W  |
| R357    | 1-216-073-00 | METAL GLAZE 10K 5%  | 1/10W   |
| R358    | 1-216-125-00 | METAL GLAZE 1.5M 5% | 1/10W   |
| R360    | 1-216-067-00 | METAL GLAZE 5.6K 5% | 1/10W   |
| R361    | 1-216-033-00 | METAL GLAZE 220 5%  | 1/10W   |
| R362    | 1-216-041-00 | METAL GLAZE 470 5%  | 1/10W   |
| R363    | 1-216-105-91 | METAL GLAZE 220K 5% | 1/10W   |
| R365    | 1-247-419-11 | CARBON 1.5K 5%      | 1/4W  |
| R372    | 1-216-057-00 | METAL GLAZE 2.2K 5% | 1/10W   |
| R377    | 1-216-295-91 | CONDUCTOR, CHIP     | (2012)  |
| R411    | 1-216-069-00 | METAL GLAZE 6.8K 5% | 1/10W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)                    |
| R430    | 1-216-089-91 | METAL GLAZE 47K 5%  | 1/10W<br>(KV-20M20/21R20/21RD1/21PM1)                                 |

The components identified by shading and mark  $\Delta$  are critical for safety .  
Replace only with part number specified.

A

| REF.NO.   | PART NO.     | DESCRIPTION   | REMARK | REF.NO. | PART NO.                        | DESCRIPTION                 | REMARK |
|---|--------------|---|--------|---------|---------------------------------|-----------------------------|--------|
| R430  | 1-216-093-00 | METAL GLAZE 68K 5% 1/10W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |        | R510    | 1-249-420-11                    | CARBON 1.8K 5% 1/4W         |        |
| R432  | 1-216-097-91 | METAL GLAZE 100K 5% 1/10W<br>(KV-20M20/21R20/21RD1/21PM1)             |        | R511    | 1-249-429-11                    | CARBON 10K 5% 1/4W          |        |
| R432  | 1-216-075-00 | METAL GLAZE 12K 5% 1/10W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |        | R512    | 1-208-806-11                    | METAL GLAZE 10K 0.50%1/10W  |        |
| R435  | 1-249-425-11 | CARBON 4.7K 5% 1/4W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)      |        | R513    | 1-208-773-11                    | METAL GLAZE 430 0.50%1/10W  |        |
| R439  | 1-216-065-91 | CHIP 4.7K 1/10W<br>(KV-20M20/21R20/21RD1/21PM1)                       |        | R515    | 1-208-806-11                    | METAL GLAZE 10K 0.50%1/10W  |        |
| R439  | 1-216-295-91 | CONDUCTOR, CHIP<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)          |        | R518    | 1-215-429-00                    | METAL 2.2K 1% 1/4W          |        |
| R450  | 1-216-049-00 | METAL GLAZE 2.2K 5% 1/10W<br>(KV-20M20/21R20/21RD1/21PM1)             |        | R519    | 1-216-467-11                    | METAL OXIDE 56K 5% 2W F     |        |
| R460  | 1-216-061-00 | METAL GLAZE 3.3K 5% 1/10W<br>(KV-20M20/21R20/21RD1/21PM1)             |        | R520    | 1-208-777-11                    | METAL GLAZE 620 0.50%1/10W  |        |
| R470  | 1-216-295-91 | CONDUCTOR, CHIP (2012)<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)   |        | R523    | 1-215-469-00                    | METAL 100K 1% 1/4W          |        |
| R477  | 1-216-081-00 | METAL GLAZE 22K 5% 1/10W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |        | R525    | $\Delta$ METAL GLAZE 0.50%1/10W |                             |        |
| R479  | 1-216-081-00 | METAL GLAZE 22K 5% 1/10W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |        | R527    | 1-208-806-11                    | METAL GLAZE 10K 0.50%1/10W  |        |
| R480  | 1-216-057-00 | METAL GLAZE 2.2K 5% 1/10W<br>(KV-20M20/21R20/21RD1/21PM1)             |        | R531    | 1-216-349-00                    | METAL OXIDE 1 5% 1W F       |        |
| < R481 - R489 LOCATED ON ><br><KV-20S20/20S21/21RS20/21SD1/21PS1/20S30> |              |   |        | R532    | 1-215-457-00                    | METAL 33K 1% 1/4W           |        |
| R481  | 1-216-041-00 | METAL GLAZE 470 5% 1/10W  |        | R533    | 1-216-355-11                    | METAL OXIDE 3.3 5% 1W F     |        |
| R482  | 1-249-429-11 | CARBON 10K 5% 1/4W  |        | R534    | 1-215-457-00                    | METAL 33K 1% 1/4W           |        |
| R483  | 1-249-429-11 | CARBON 10K 5% 1/4W  |        | R536    | 1-215-437-00                    | METAL 4.7K 1% 1/4W          |        |
| R484  | 1-216-013-00 | METAL GLAZE 33 5% 1/10W   |        | R538    | 1-215-864-00                    | METAL OXIDE 150 5% 1W F     |        |
| R486  | 1-216-013-00 | METAL GLAZE 33 5% 1/10W   |        | R540    | 1-249-441-11                    | CARBON 100K 5% 1/4W         |        |
| R487  | 1-249-417-11 | CARBON 1K 5% 1/4W   |        | R542    | 1-216-093-00                    | METAL GLAZE 68K 5% 1/10W    |        |
| R488  | 1-216-298-00 | METAL GLAZE 2.2 5% 1/10W  |        | R543    | 1-208-842-11                    | METAL GLAZE 330K 0.50%1/10W |        |
| R489  | 1-249-417-11 | CARBON 1K 5% 1/4W   |        | R544    | 1-208-787-11                    | METAL GLAZE 1.6K 0.50%1/10W |        |
| R490  | 1-249-417-11 | CARBON 1K 5% 1/4W   |        | R545    | 1-249-441-11                    | CARBON 100K 5% 1/4W         |        |
| R491  | 1-249-411-11 | CARBON 330 5% 1/4W  |        | R547    | 1-249-429-11                    | CARBON 10K 5% 1/4W          |        |
| R492  | 1-249-411-11 | CARBON 330 5% 1/4W  |        | R548    | 1-216-113-00                    | METAL GLAZE 470K 5% 1/10W   |        |
| R493  | 1-216-298-00 | METAL GLAZE 2.2 5% 1/10W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |        | R549    | 1-216-369-00                    | METAL OXIDE 1 5% 2W F       |        |
| R494  | 1-249-417-11 | CARBON 1K 5% 1/4W<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30)        |        | R550    | 1-216-295-91                    | CONDUCTOR, CHIP (2012)      |        |
| R495  | 1-216-349-00 | METAL OXIDE 1 5% 1W F   |        | R554    | 1-216-057-00                    | METAL GLAZE 2.2K 5% 1/10W   |        |
| R501  | 1-216-073-00 | METAL GLAZE 10K 5% 1/10W  |        | R555    | 1-215-922-11                    | METAL OXIDE 6.8K 5% 3W F    |        |
| R505  | 1-216-349-00 | METAL OXIDE 1 5% 1W F   |        | R559    | 1-216-089-91                    | METAL GLAZE 47K 5% 1/10W    |        |
| R506  | 1-216-453-00 | METAL OXIDE 270 5% 2W F   |        | R560    | 1-216-097-91                    | METAL GLAZE 100K 5% 1/10W   |        |
| R507  | 1-247-891-00 | CARBON 330K 5% 1/4W   |        | R563    | 1-215-880-00                    | METAL OXIDE 10 5% 2W F      |        |
| R508  | 1-249-417-11 | CARBON 1K 5% 1/4W   |        | R590    | 1-216-295-91                    | CONDUCTOR, CHIP (2012)      |        |
| R509  | 1-216-101-00 | METAL GLAZE 150K 5% 1/10W   |        | R601    | $\Delta$ 1-219-513-11           | RES(SURGE RES) 4.7M 5% 1/2W |        |
|   |              |   |        | R602    | 1-216-073-00                    | METAL GLAZE 10K 5% 1/10W    |        |
|   |              |   |        | R603    | $\Delta$ 1-205-998-11           | CEMENT 1 5% 10W             |        |
|   |              |   |        | R605    | 1-216-057-00                    | METAL GLAZE 2.2K 5% 1/10W   |        |
|   |              |   |        | R606    | 1-260-288-11                    | CARBON 0.47 5% 1/2W         |        |
|   |              |   |        | R609    | 1-216-353-00                    | METAL OXIDE 2.2 5% 1W F     |        |
|   |              |   |        | R610    | 1-216-353-00                    | METAL OXIDE 2.2 5% 1W F     |        |
|   |              |   |        | R611    | 1-249-396-11                    | CARBON 18 5% 1/4W           |        |
|   |              |   |        | R612    | 1-249-396-11                    | CARBON 18 5% 1/4W           |        |
|   |              |   |        | R615    | 1-216-093-00                    | METAL GLAZE 68K 5% 1/10W    |        |
|   |              |   |        | R616    | 1-216-057-00                    | METAL GLAZE 2.2K 5% 1/10W   |        |
|   |              |   |        | R617    | $\Delta$ 1-208-790-11           | METAL GLAZE 2.2K 0.50%1/10W |        |
|   |              |   |        | R618    | $\Delta$ 1-215-469-00           | METAL 100K 1% 1/4W          |        |
|   |              |   |        | R619    | 1-216-001-00                    | METAL GLAZE 10 5% 1/10W     |        |
|   |              |   |        | R620    | 1-216-073-00                    | METAL GLAZE 10K 5% 1/10W    |        |
|   |              |   |        | R622    | 1-216-073-00                    | METAL GLAZE 10K 5% 1/10W    |        |
|   |              |   |        | R623    | 1-216-073-00                    | METAL GLAZE 10K 5% 1/10W    |        |
|   |              |   |        | R625    | 1-216-377-11                    | METAL OXIDE 4.7 5% 2W F     |        |
|   |              |   |        | R628    | 1-249-415-11                    | CARBON 680 5% 1/4W          |        |
|   |              |   |        | R629    | 1-208-806-11                    | METAL GLAZE 10K 0.50%1/10W  |        |
|   |              |   |        | R630    | 1-208-826-11                    | METAL GLAZE 68K 0.50%1/10W  |        |
|   |              |   |        | R635    | 1-212-857-00                    | RES,FUSIBLE 10 5% 1/4W F    |        |

**A C**

The components identified by shading and mark **A** are critical for safety. Replace only with part number specified.

| REF.NO.       | PART NO.     | DESCRIPTION         | REMARK |
|---------------|--------------|---------------------|--------|
| R639          | 1-249-425-11 | CARBON 4.7K 5%      | 1/4W   |
| R640          | 1-216-085-00 | METAL GLAZE 33K 5%  | 1/10W  |
| R641          | 1-247-889-00 | CARBON 270K 5%      | 1/4W   |
| R643          | 1-247-889-00 | CARBON 270K 5%      | 1/4W   |
| R645          | 1-247-893-11 | CARBON 390K 5%      | 1/4W   |
| R651 <b>A</b> | 1-216-089-91 | METAL GLAZE 47K 5%  | 1/10W  |
| R652 <b>A</b> | 1-216-073-00 | METAL GLAZE 10K 5%  | 1/10W  |
| R653 <b>A</b> | 1-216-065-00 | METAL GLAZE 4.7K 5% | 1/10W  |
| R654 <b>A</b> | 1-216-073-00 | METAL GLAZE 10K 5%  | 1/10W  |
| R655          | 1-216-085-00 | METAL GLAZE 33K 5%  | 1/10W  |
| R656          | 1-216-089-91 | METAL GLAZE 47K 5%  | 1/10W  |
| R681          | 1-216-089-91 | METAL GLAZE 47K 5%  | 1/10W  |
| R682          | 1-216-073-00 | METAL GLAZE 10K 5%  | 1/10W  |
| R683          | 1-215-924-00 | METAL OXIDE 15K 5%  | 3W F   |
| R684          | 1-249-429-11 | CARBON 10K 5%       | 1/4W   |
| R690          | 1-216-355-11 | METAL OXIDE 3.3 5%  | 1W F   |
| R704          | 1-216-370-11 | METAL OXIDE 1.2 5%  | 2W F   |

<RELAY>

RY601 **A** 1-755-018-11 RELAY

<SWITCH>

|      |              |                 |
|------|--------------|-----------------|
| S001 | 1-692-431-21 | SWITCH, TACTILE |
| S002 | 1-692-431-21 | SWITCH, TACTILE |
| S003 | 1-692-431-21 | SWITCH, TACTILE |
| S004 | 1-692-431-21 | SWITCH, TACTILE |
| S005 | 1-692-431-21 | SWITCH, TACTILE |
| S006 | 1-692-431-21 | SWITCH, TACTILE |

<TRANSFORMER>

|               |              |                                |
|---------------|--------------|--------------------------------|
| T504 <b>A</b> | 8-598-961-00 | TRANSFORMER ASSY, FLYBACK      |
| T551          | 1-437-195-11 | TRANSFORMER, HORIZONTAL DRIVE  |
| T602 <b>A</b> | 1-423-895-11 | TRANSFORMER, LINE FILTER (LFT) |
| T603 <b>A</b> | 1-429-483-21 | TRANSFORMER, CONVERTER (PIT)   |
| T604 <b>A</b> | 1-427-864-11 | TRANSFORMER, CONVERTER (PRT)   |

<THERMISTOR>

THP601 **A** 1-810-597-11 THERMISTOR, POSITIVE

<TUNER>

|                |              |  |
|----------------|--------------|--|
| TU101 <b>A</b> | 8-598-339-00 | TUNER BTF-LA402<br>(KV-20M20/21R01/21PM1/21R20)              |
| TU101 <b>A</b> | 8-598-341-00 | TUNER BTF-WA405<br>(KV-20S20/20S21/21RS20/21SD1/21PS1/20S30) |

<VARISTOR>

VDR601 1-801-074-41 VARISTOR ERZV10D271

<CRYSTAL>

|      |              |                     |
|------|--------------|---------------------|
| X300 | 1-577-611-11 | OSCILLATOR, CERAMIC |
| X303 | 1-760-190-41 | VIBRATOR, CRYSTAL   |

| REF.NO. | PART NO. | DESCRIPTION | REMARK |
|---------|----------|-------------|--------|
|---------|----------|-------------|--------|

\* A-1331-518-A MOUNTED PCB, C  
\*\*\*\*\*

1-900-800-64 CONNECTOR ASSY, 1P G2 SCREEN

<CAPACITOR>

|      |              |                    |         |
|------|--------------|--------------------|---------|
| C701 | 1-162-114-00 | CERAMIC 4700pF     | 2KV     |
| C706 | 1-126-965-11 | ELECT 22MF         | 20% 50V |
| C712 | 1-163-007-11 | CERAMIC CHIP 680pF | 10% 50V |
| C732 | 1-163-007-11 | CERAMIC CHIP 680pF | 10% 50V |
| C752 | 1-163-007-11 | CERAMIC CHIP 680pF | 10% 50V |
| C771 | 1-102-110-00 | CERAMIC 220pF      | 10% 50V |
| C772 | 1-102-110-00 | CERAMIC 220pF      | 10% 50V |
| C773 | 1-102-110-00 | CERAMIC 220pF      | 10% 50V |

<CONNECTOR>

|       |              |                               |
|-------|--------------|-------------------------------|
| CN701 | 1-695-915-11 | TAB (CONTACT)                 |
| CN702 | 1-900-800-66 | CONNECTOR ASSY 4P MINI MICRO  |
| CN703 | 1-900-800-67 | CONNECTOR ASSY. 6P MINI MICRO |

<DIODE>

|      |              |                  |
|------|--------------|------------------|
| D770 | 8-719-991-33 | DIODE 1SS133T-77 |
| D771 | 8-719-991-33 | DIODE 1SS133T-77 |
| D772 | 8-719-991-33 | DIODE 1SS133T-77 |
| D773 | 8-719-991-33 | DIODE 1SS133T-77 |
| D777 | 8-719-109-72 | DIODE MTZJ-3.9B  |

<JACK>

J701 **A** 1-251-182-11 SOCKET, CRT

<COIL>

|      |              |               |
|------|--------------|---------------|
| L702 | 1-408-419-00 | INDUCTOR 68UH |
|------|--------------|---------------|

<TRANSISTOR>

|      |              |                           |
|------|--------------|---------------------------|
| Q711 | 8-729-326-11 | TRANSISTOR 2SC4722TE4N    |
| Q731 | 8-729-326-11 | TRANSISTOR 2SC4722TE4N    |
| Q751 | 8-729-326-11 | TRANSISTOR 2SC4722TE4N    |
| Q770 | 8-729-119-76 | TRANSISTOR 2SA1309A-QRSTA |
| Q771 | 8-729-200-17 | TRANSISTOR 2SA1091-0      |
| Q772 | 8-729-200-17 | TRANSISTOR 2SA1091-0      |
| Q773 | 8-729-200-17 | TRANSISTOR 2SA1091-0      |

<RESISTOR>

|      |              |                    |        |
|------|--------------|--------------------|--------|
| R700 | 1-260-087-11 | CARBON 100 5%      | 1/2W   |
| R703 | 1-260-105-11 | CARBON 3.3K 5%     | 1/2W   |
| R710 | 1-260-099-11 | CARBON 1K 5%       | 1/2W   |
| R712 | 1-215-924-00 | METAL OXIDE 15K 5% | 3W F   |
| R716 | 1-249-411-11 | CARBON 330 5%      | 1/4W   |
| R717 | 1-216-295-91 | CONDUCTOR, CHIP    | (2012) |
| R730 | 1-260-099-11 | CARBON 1K 5%       | 1/2W   |
| R732 | 1-215-924-00 | METAL OXIDE 15K 5% | 3W F   |
| R736 | 1-249-411-11 | CARBON 330 5%      | 1/4W   |
| R737 | 1-216-295-91 | CONDUCTOR, CHIP    | (2012) |
| R750 | 1-260-099-11 | CARBON 1K 5%       | 1/2W   |
| R751 | 1-216-295-91 | CONDUCTOR, CHIP    | (2012) |

The components identified by shading and mark  $\Delta$  are critical for safety .  
Replace only with part number specified.

C

| REF.NO.                | PART NO.     | DESCRIPTION  | REMARK |
|------------------------|--------------|--|--------|
| R752                   | 1-215-924-00 | METAL OXIDE 15K 5% 3W F  |        |
| R756                   | 1-249-411-11 | CARBON 330 5% 1/4W   |        |
| R757                   | 1-216-295-91 | CONDUCTOR, CHIP (2012)   |        |
| R770                   | 1-216-081-00 | METAL GLAZE 22K 5% 1/10W   |        |
| R771                   | 1-216-049-91 | METAL GLAZE 1K 5% 1/10W  |        |
| R772                   | 1-216-049-91 | METAL GLAZE 1K 5% 1/10W  |        |
| R773                   | 1-216-049-91 | METAL GLAZE 1K 5% 1/10W  |        |
| R774                   | 1-216-089-91 | METAL GLAZE 47K 5% 1/10W   |        |
| R775                   | 1-216-049-91 | METAL GLAZE 1K 5% 1/10W  |        |
| R776                   | 1-216-033-00 | METAL GLAZE 220 5% 1/10W   |        |
| MISCELLANEOUS<br>***** |              |  |        |
|                        | X-4308-815-0 | PERMALLOY ASSY, CONVERGENCE  |        |
| $\Delta$               | 1-409-707-31 | COIL, DEMAGNETIZATION  |        |
|                        | 1-452-032-00 | MAGNET, DISC   |        |
|                        | 1-452-277-00 | MAGNET, BMC  |        |
|                        | 1-505-265-11 | SPEAKER (9X5CM)<br>(KV-20M20/21RD1/21PM1/21R20)  |        |
|                        | 1-505-266-11 | SPEAKER (9X5CM)<br>(KV-20S30/20S20/20S21/21SD1/21PS1/21RS20)   |        |
| $\Delta$               | 1-751-057-11 | CORD, POWER (WITH CONNECTOR) 10A/125V<br>(KV-20M20/21R20/21RD1/21PM1/20S20/21RS20/21SD1/21PS1/20S30) |        |
| $\Delta$               | 1-751-058-11 | CORD, POWER (WITH CONNECTOR) 10A/125V<br>(KV-20S21)  |        |
|                        | 1-766-374-11 | PLUG, F-PIN  |        |
|                        | 4-046-161-01 | EMBLEM (NO.8), SONY  |        |
|                        | 4-052-639-01 | BUTTON, MULTI<br>(KV-20M20/21R20/21RD1/21PM1/20S20/21RS20/21SD1/21PS1/20S30)                         |        |
|                        | 4-052-639-11 | BUTTON, MULTI (KV-20S21)   |        |
|                        | 4-052-640-01 | FILTER, REMOTE   |        |
|                        | 4-052-641-01 | DOOR, CONTROL<br>(KV-21R20/20S20/21RS20/21PS1/20S30)   |        |
|                        | 4-052-641-21 | DOOR, CONTROL (KV-20M20/21PM1)   |        |
|                        | 4-052-641-41 | DOOR, CONTROL (KV-20S21)   |        |
|                        | 4-052-641-51 | DOOR, CONTROL (KV-21RD1)   |        |
|                        | 4-052-641-61 | DOOR, CONTROL (KV-21SD1)   |        |
| *                      | 4-369-319-11 | BAND, DEGAUSSING COIL  |        |
| *                      | 4-375-394-01 | SPRING, TENSION  |        |
| $\Delta$               | 8-451-440-11 | DY Y21NXA (VTM)  |        |
| $\Delta$               | 8-738-768-05 | CRT 21NX<br>(KV-20M20/21R20/21RD1/21PM1/20S30/20S20(US)/20S21/21SD1/21PS1)                           |        |
| $\Delta$               | 8-738-781-05 | CRT 21MX (KV-20S20(CND)/21RS20)  |        |

| REF.NO.                                    | PART NO.     | DESCRIPTION   | REMARK |
|--|--------------|---|--------|
| ACCESSORIES AND PACKING MATERIALS<br>***** |              |   |        |
|  | 1-417-182-11 | CONVERTER<br>(KV-21R20/21RD1/21PM1/21RS20/21SD1/21PS1)  |        |
|  | 1-501-730-41 | ANTENNA, TELESCOPE<br>(KV-21R20/21RD1/21PM1/21RS20/21SD1/21PS1)                                   |        |
|  | 3-701-627-00 | BAG, POLYETHYLENE   |        |
|  | 3-810-814-21 | MANUAL, INSTRUCTION<br>(KV-20M20/20S20/20S30/20S21)   |        |
|  | 3-810-814-41 | MANUAL, INSTRUCTION<br>(KV-21R20/21RD1/21PM1/21RS20/21SD1/21PS1)                                  |        |
| *  | 4-041-254-01 | BAG, PROTECTION   |        |
| *  | 4-052-645-01 | CUSHION (LOWER) (ASSY)  |        |
| *  | 4-052-648-01 | CUSHION (UPPER) (ASSY)  |        |
| *  | 4-052-651-01 | CARTON, INDIVIDUAL<br>(KV-20M20/20S20/20S30/20S21)  |        |
| *  | 4-052-663-01 | CARTON, INDIVIDUAL (KV-21R20/21RS20)  |        |
| *  | 4-053-800-01 | CARTON, INDIVIDUAL (KV-21RD1/21SD1)   |        |
| *  | 4-053-803-01 | CARTON, INDIVIDUAL (KV-21PM1/21PS1)   |        |
| REMOTE COMMANDER<br>*****                  |              |   |        |
|  | 1-466-966-31 | REMOTE COMMANDER (RM-Y116) BLACK<br>(KV-20M20/21R20/21RD1/21PM1/20S20/21RS20/21SD1/21PS1/20S30)   |        |
|  | 1-466-966-41 | REMOTE COMMANDER (RM-Y116) WHITE (KV-20S21)   |        |
|  | 9-903-826-11 | COVER, BATTERY (FOR RM-Y116) BLACK<br>(KV-20M20/21R20/21RD1/21PM1/20S20/21RS20/21SD1/21PS1/20S30) |        |
|  | 9-903-826-21 | COVER, BATTERY (FOR RM-116) WHITE (KV-20S21)  |        |

# MEMO

Handwriting practice lines consisting of 30 horizontal dotted lines.